PROGRAM PROGRAMME
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Red Seal Occupational Standard

Roofer

INTERPROVINCIAL STANDARD
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ROOFER

Title: Roofer

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Red Seal Occupational Standard (RSOS) as the Red Seal standard for the Roofer trade.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. Employment and Social Development Canada (ESDC) sponsors the Red Seal Program, which, under the guidance of the CCDA, develops a national occupational standard for each of the Red Seal trades.

Standards have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and assessment tools for apprenticeship and certification authorities;
- to develop common tools for apprenticeship on-the-job and technical training in Canada;
- to facilitate the mobility of apprentices and skilled workers in Canada;
- to supply employers, employees, associations, industries, training institutions and governments with occupational standards.

Any questions, comments, or suggestions for changes, corrections, or revisions to this standard or any of its related products may be forwarded to:

Trades and Apprenticeship Division
Apprenticeship and Sectoral Initiatives Directorate
Employment and Social Development Canada
140 Promenade du Portage, Phase IV, 6th Floor
Gatineau, Quebec K1A 0J9

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This standard was prepared by the Apprenticeship and Sectoral Initiatives Directorate of ESDC. The coordinating, facilitating and processing of this standard were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and of Saskatchewan, the host jurisdiction for this trade.

STRUCTURE OF THE OCCUPATIONAL STANDARD

This standard contains the following sections:

Methodology: an overview of the process for development, review, validation and weighting of the standard

Description of the Roofer trade: an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Roofer trade: some of the trends identified by industry as being the most important for workers in this trade

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade

Roles and Opportunities for Skilled Trades in a Sustainable Future: an overarching description of how in the context of climate change, skilled trades play a large role in implementing solutions and adjusting to changes in the world. In addition to highlighting the importance of this awareness, the standard may also contain more details on activities, skills and knowledge elements that are specific to the trade

Industry Expected Performance: description of the expectations regarding the level of performance of the tasks, including information related to specific codes, regulations and standards that must be observed

Language Requirements: description of the language requirements for working and studying in this trade in Canada

Pie Chart of Red Seal Examination Weightings: a graph which depicts the national percentages of exam questions assigned to the major work activities

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard

Harmonization of Apprenticeship Training: the aspects of apprenticeship training that participating provinces and territories have agreed upon to substantively align apprenticeship systems across Canada

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities

Task: distinct actions that describe the activities within a major work activity

Task Descriptor: a general description of the task

Sub-task: distinct actions that describe the activities within a task

Skills:

Performance Criteria: description of the activities that are done as the sub-task is performed

Evidence of Attainment: proof that the activities of the sub-task meet the expected performance of a tradesperson who has reached journeyperson level

Knowledge:

Learning Outcomes: describes what should be learned relating to a sub-task while participating in technical or in-school training

Learning Objectives: topics to be covered during technical or in-school training in order to meet the learning outcomes for the sub-task

Range of Variables: elements that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

Appendix A – Acronyms: a list of acronyms used in the standard with their full name

Appendix B – Tools and Equipment / Outils et équipement: a non-exhaustive list of tools and equipment used in this trade

Appendix C – Glossary / Glossaire: definitions or explanations of selected technical terms used in the standard

METHODOLOGY

Development of the Standard

A draft standard is developed by a broad group of trade representatives, including tradespeople, instructors and employers at a National Workshop led by a team of facilitators. This draft standard breaks down all the tasks performed in the occupation and describes the knowledge and abilities required for a tradesperson to demonstrate competence in the trade.

Harmonization of Apprenticeship Training

An analysis of all provinces' and territories' apprenticeship programs is performed and recommendations are made on harmonizing the name of the trade, the hours of training required and the number of levels of training. Provinces and territories consult with their respective industry stakeholders on these elements and revisions are discussed until consensus is reached. Following the development of the workshop draft of the RSOS, participants discuss and come to consensus on the sequence of training topics, as expressed in the new standard. Their sequencing recommendations are reviewed by stakeholders in participating provinces and territories and further discussions are convened to reach consensus and to identify any exceptions.

Online Survey

Stakeholders are asked to review and validate the activities described in the new standard via an online survey. These stakeholders are invited to participate in this consultation through apprenticeship authorities, as well as national stakeholder groups.

Draft Review

The RSOS development team forwards a copy of the standard and its translation to provincial and territorial authorities who consult with industry representatives to review it. Their recommendations are assessed and incorporated into the standard.

Validation and Weighting

Participating provinces and territories also consult with industry to validate and weight the document for the purpose of planning the makeup of the Red Seal Interprovincial Examination for the trade. They validate and weight the major work activities (MWA), tasks and sub-tasks, of the standard as follows:

MWA	Each jurisdiction assigns a percentage of questions to each MWA for an examination that would cover the entire trade.
TASKS	Each jurisdiction assigns a percentage of exam questions to each task within a MWA.
SUB-TASKS	Each jurisdiction indicates, with a YES or NO, whether or not each sub-task is performed by skilled workers within the occupation in its jurisdiction.

The results of this exercise are submitted to the RSOS development team who then analyzes the data and incorporates it into the document. The RSOS provides the individual jurisdictional validation results as well as the national averages of all responses. The national averages for MWA and task weighting guide the Interprovincial Red Seal Examination plan for the trade.

The validation of the RSOS is used to identify common core sub-tasks across Canada for the occupation. If at least 70% of the responding jurisdictions' industry performs a sub-task, it shall be considered common core. Interprovincial Red Seal Examination questions are limited to the common core sub-tasks identified through this validation process.

Definitions for Validation and Weighting

YES	sub-task performed by qualified workers in the occupation in that province or territory
NO	sub-task not performed by qualified workers in the occupation in that province or territory
NV	standard Not Validated by that province or territory
ND	trade Not Designated in a province or territory
NOT COMMON CORE (NCC)	sub-task, task or MWA performed less than 70% of responding jurisdictions; these will not be tested by the Interprovincial Red Seal Examination for the trade
NATIONAL AVERAGE %	average percentage of questions assigned to each MWA and task in Interprovincial Red Seal Examination for the trade

Provincial/Territorial Abbreviations

NL	Newfoundland and Labrador
NS	Nova Scotia
PE	Prince Edward Island
NB	New Brunswick
QC	Quebec
ON	Ontario
MB	Manitoba
SK	Saskatchewan
AB	Alberta
BC	British Columbia
NT	Northwest Territories
YT	Yukon Territory
NU	Nunavut

DESCRIPTION OF THE ROOFER TRADE

“Roofer” is this trade’s official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by roofers whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Roofer	■	■	■	■	■	■	■	■	■		■	■	■
Roofer (Roofer, Damp and Waterproofer)										■			

Roofers install, repair, maintain and replace roofing systems. They work with membrane roofing systems that consist of a variety of materials with different application methods. They also install, replace, maintain and repair shingles, slates, shakes, roofing tiles, sheet metal and other pre-formed sheeting on sloped roofs.

Before the work begins, roofers may inspect existing roof systems and determine the extent and procedure for repair of the roofing assembly components or removal, re-covering and replacement of roofing materials. Some roofers may be involved in the estimating of material and installation costs.

As part of the job preparation, roofers may set up scaffolding to provide safe access to the work area and may install fall protection systems. They also weatherproof, waterproof and damp-proof roofing surfaces, foundation walls, floor slabs and bridge decks. They may install roofing accessories such as sheet metal flashings, roof vent flashings, anchor tie-off flashings, drain inserts and clamps.

Roofers may be employed by roofing companies, general contractors or they may be self-employed. They may work on all types of roofs or may specialize in the low sloped roofs of commercial and industrial buildings or on the steep sloped roofs found in most residential buildings.

Key attributes for people in this trade are mechanical aptitude, manual dexterity and the ability to work in a team. Roofers work primarily outdoors and work may be seasonal. The work environment is exposed and may vary from extreme cold to extreme heat. Roofing is physically demanding work and requires considerable effort in lifting, climbing, bending, kneeling and balancing on high, sloped and sometimes slippery surfaces.

Roofers work in conjunction with other tradespeople in the construction trades such as sheet metal workers, mechanical contractors, electricians and carpenters in industrial, commercial, institutional and residential sectors. With additional training, roofers may transfer their skills to related occupations such as carpenter, sheet metal worker, bricklayer and glazier. With experience, they may advance to positions such as supervisors, estimators, project managers, contractors, consultants, technical representatives or inspectors.

TRENDS IN THE ROOFER TRADE

NEW PRODUCTS

There is an increase in the types of roofing system designs available to meet the ever-changing Canadian environment. Eco-friendlier roof designs such as green roofs and reflective roof materials are more common. In addition, more environmentally friendly products are being used, such as single-ply membranes, cold-applied and mechanically fastened systems, rather than hot-applied bitumen.

Due to the environmental impacts and health risks of hot asphalt products, new innovations such as low-rise adhesives are replacing these products in many roof system designs. These adhesives may have their own risks and must be used according to manufacturers' specifications.

On low slope roofing, chemical adhesives are reducing the need for asphalt and mechanical fasteners. In many roof applications, there are more self-adhesive materials that are used. The use of adhesives reduces thermal bridging that is inherent with mechanical fasteners.

There are new adhesives on the market that are low-volatile organic compounds (LVOC) that are replacing solvent-based adhesives which are used for the securement of roofing components. These new adhesives reduce volatile off-gassing in confined spaces.

Cold applied systems reduce the risk of fire during installation. Insurance companies and manufacturers are supporting this method as a safer way to install the roofing system.

There is an increase in synthetic underlayments on the market. These are applied under a steep slope roof and are lighter and last longer than traditional barriers.

Terminology in the industry is evolving as well. For example, the acronyms MARS, AARS and PARS are entering the roofing vocabulary. MARS stands for mechanically attached roofing system. AARS stands for adhesive adhered roofing system. PARS stands for partially adhered roofing system.

TOOLS AND EQUIPMENT

The trade has become more mechanized with many pieces of equipment such as automatic membrane installation equipment and heat induction equipment. These have increased productivity and efficiency and may reduce labour requirements. They may also help reduce the risk of personal injury and property damage. Roofers need to be trained in the proper use and maintenance of this new equipment.

HEALTH AND SAFETY

There is more emphasis on safety training and orientation in the workplace. In some jurisdictions, it is mandatory for employees to take fall protection / working at heights, and site and task specific safety policy and procedures training.

Mobile fall protection systems are now being used to reduce risk and injury on buildings that do not have permanent anchoring systems in place.

ENVIRONMENTAL

Recycling roofing materials and refacing are becoming more popular due to environmental concerns and LEED requirements on construction projects. These new practices may reduce disposal costs.

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.html.

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at http://www.red-seal.ca/.

READING

Roofers read instructions on work orders as well as application and installation instructions for roofing products and materials. They read information sheets to learn about new products and materials. They also need to refer to blueprints and specifications to complete roofing jobs.

DOCUMENT USE

Roofers reference documents such as work orders, plans and specifications and site-specific safety plans that are required for construction, alteration and repairs. They identify the location and orientation of parts in assembly drawings of equipment. Roofers read Workplace Hazardous Material Information System (WHMIS) documentation to obtain and follow safe handling and application procedures.

WRITING

Roofers may write in logbooks and on contract forms and work orders to describe the work that needs to be done. They may fill out maintenance and inspection reports. They are required to complete safety documents according to jurisdictional regulations.

ORAL COMMUNICATION

Roofers communicate with colleagues, other trade workers, manufacturers and supervisors to discuss and review job and safety requirements. They speak to customers to explain procedures used for application and disposal of roofing materials. They may also use specialized communication such as hand signals to communicate with crane or hoist operators when moving materials and equipment.

NUMERACY

Roofers measure the length, width and height of roof surfaces so they can order the correct amount of materials to complete a roofing job. They also use drawings to calculate material requirements. Roofers use numeracy skills to determine the layout of shingles. They may use thermometers to measure the temperature of roofing materials and working environments to ensure conditions are appropriate for application of the materials.

THINKING

Roofers use problem solving skills to address oversights and discrepancies on the job site. They assess roof conditions and consult with supervisors and clients to adjust the scope of a roofing job. They must anticipate changes in weather to prevent damage to an existing roofing structure and to roofing material. Roofers use decision making skills to decide the start and end of work considering factors such as weather and the availability of supplies and labour. They use critical thinking skills to judge the quality of finished roofing jobs. They also test to make sure roofing materials are sealed and have adhered properly.

WORKING WITH OTHERS

Most roofers work collaboratively on teams to complete roofing projects. They discuss safety, work processes, installation improvements and quality control.

DIGITAL TECHNOLOGY

Roofers may use digital technology to communicate with others in the industry. They may also use the Internet to look up product and safety information. Documentation is increasingly being accessed and completed with digital tools such as smart phones, tablets and laptops. Specialized apps are available for accessing manufacturers' information and installation instructions.

CONTINUOUS LEARNING

Roofers are continuously learning in order to keep abreast of new roofing products, application procedures and safety precautions. They take WHMIS and provincial/territorial construction safety courses, as well as other safety-related courses to stay current. Manufacturers sometimes provide training on their products. Roofers may also learn from manuals and newsletters.

INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to the applicable jurisdictional regulations, codes and standards. All health and safety standards must be respected and observed. Work should be done efficiently and to a high quality without material waste or environmental damage. All requirements of employers, engineers, designers, manufacturers, clients and quality control policies must be met. At a journeyperson level of performance, all tasks must be done with minimal direction and supervision. As a journeyperson progresses in their career there is an expectation they continue to upgrade their skills and knowledge to maintain pace with industry and promote continuous learning in their trade through mentoring of apprentices.

Roles and Opportunities for Skilled Trades in a Sustainable Future

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.

- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.

- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.

- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).

- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).

- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.

- the Montreal Protocol for phasing out R22 refrigerants.

- energy efficiency programs such as ENERGY STAR.

- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

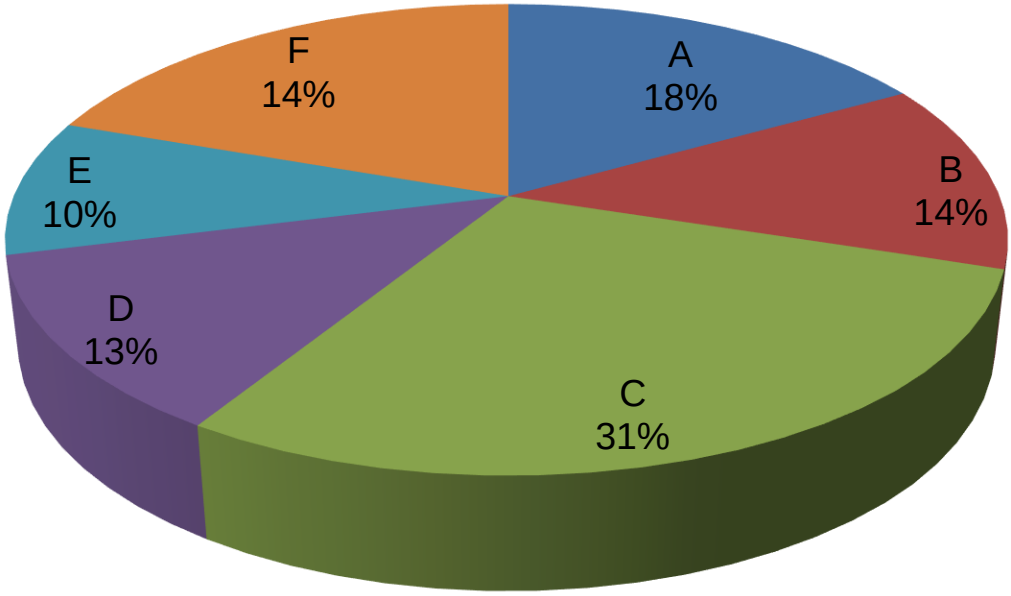
All in all, it's about doing the work better and building a better world.

LANGUAGE REQUIREMENTS

It is expected that journeypersons are able to understand and communicate in either English or French, which are Canada's official languages. English or French are the common languages of business as well as languages of instruction in apprenticeship programs.

PIE CHART

OF RED SEAL EXAMINATION WEIGHTINGS



MWA A	Performs common occupational skills	18%
MWA B	Prepares roof and deck	14%
MWA C	Installs low slope roofing	31%
MWA D	Installs steep slope roofing	13%
MWA E	Waterproofs and damp-proofs surfaces	10%
MWA F	Assesses, maintains and repairs roof	14%

This pie chart represents a breakdown of the interprovincial Red Seal examination. Percentages are based on the collective input from workers from the trade from across Canada. The Task Matrix on the next pages indicates the breakdown of tasks and sub-tasks within each Major Work Activity and the breakdown of questions assigned to the Tasks. The Interprovincial examination for this trade has 125 questions.

ROOFER

TASK MATRIX

A – Performs common occupational skills — 18%

Task A-1 **Performs safety-related functions** **32%**	**A-1.01 Maintains safe work environment**	**A-1.02 Uses personal protective equipment (PPE) and safety equipment**	
Task A-2 **Uses tools and equipment** **30%**	**A-2.01 Uses hand tools**	**A-2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment**	**A-2.03 Uses hoisting, lifting and rigging equipment**
	A-2.04 Uses access equipment	**A-2.05 Uses hot process equipment**	**A-2.06 Uses motorized equipment**
Task A-3 **Organizes work** **24%**	**A-3.01 Uses documentation and reference materials**	**A-3.02 Interprets blueprints and drawings**	**A-3.03 Estimates material**
	A-3.04 Assesses worksite conditions	**A-3.05 Positions equipment and material on the ground and on the roof**	**A-3.06 Prepares material disposal systems**
	A-3.07 Evaluates roof conditions near rooftop equipment installations		
Task A-4 **Uses communication and mentoring techniques** **14%**	**A-4.01 Uses communication techniques**	**A-4.02 Uses mentoring techniques**	

B – Prepares roof and deck

14%

Task B-5 **Prepares roof for replacement** **53%**	**B-5.01 Protects surrounding area**	**B-5.02 Removes loose debris**	**B-5.03 Removes roofing and flashings**
	B-5.04 Prepares roof substrate	**B-5.05 Performs minor adjustments to penetrations, curbs and parapets**	
Task B-6 **Prepares deck for roof installation** **47%**	**B-6.01 Inspects deck**	**B-6.02 Cleans surface of deck**	**B-6.03 Verifies placement of roof penetrations, curbs and parapets**
	B-6.04 Dries deck		

C – Installs low slope roofing

31%

Task C-7 **Applies low slope roofing components** **49%**	**C-7.01 Installs support panels**	**C-7.02 Primes substrate**	**C-7.03 Applies vapour retarder, vapour barrier and air barrier**
	C-7.04 Installs insulation	**C-7.05 Installs cover board**	**C-7.06 Installs drains, vents, curbs and penetrations**
	C-7.07 Applies ballast, walkways and protective surfaces	**C-7.08 Installs metal flashings**	

Task C-8 Applies low slope roofing membranes 51%	C-8.01 Relaxes membranes	C-8.02 Sets membranes	C-8.03 Applies membranes using hot-liquid process
	C-8.04 Applies membranes using torched-on method	C-8.05 Applies membranes using hot-air welding	C-8.06 Applies membranes using cold applied methods
	C-8.07 Applies membranes using mechanical fasteners	C-8.08 Applies loose-laid membranes	C-8.09 Applies liquid-applied membranes
	C-8.10 Installs membrane flashings	C-8.11 Installs temporary seals and temporary drains	

D – Installs steep slope roofing — 13%

Task D-9 Performs common steep slope practices 34%	D-9.01 Installs steep slope underlayment	D-9.02 Installs steep slope venting	D-9.03 Installs steep slope valley applications
	D-9.04 Installs steep slope saddles/crickets	D-9.05 Installs steep slope penetration flashings	
Task D-10 Applies shingles 33%	D-10.01 Determines layout of shingles	D-10.02 Installs starter strip and starter course	D-10.03 Fastens shingles
	D-10.04 Cuts shingles	D-10.05 Tabs shingles	D-10.06 Installs metal flashings for shingled roofs

Task D-11 **Applies roof tiles** **14%**	**D-11.01 Installs battens/strapping for roof tiles**	**D-11.02 Fastens roof tiles**	**D-11.03 Cuts roof tiles**
	D-11.04 Installs closure strips for roof tiles	**D-11.05 Installs ridge and hip caps**	**D-11.06 Installs metal flashings for tiled roofs**
Task D-12 **Applies pre-formed metal roofing** **19%**	**D-12.01 Installs battens/strapping for pre-formed metal roofing**	**D-12.02 Fastens pre-formed metal roofing**	**D-12.03 Cuts sheet metal**
	D-12.04 Installs closure strips for pre-formed metal roofing	**D-12.05 Installs snow guards**	**D-12.06 Installs metal flashings for pre-formed metal roofs**

E – Waterproofs and damp-proofs surfaces — 10%

Task E-13 **Waterproofs surfaces** **65%**	**E-13.01 Prepares waterproofing substrates**	**E-13.02 Applies waterproofing membrane**	**E-13.03 Installs green, sustainable, vegetative and protected membrane components**
Task E-14 **Damp-proofs surfaces** **35%**	**E-14.01 Applies damp-proofing materials**	**E-14.02 Applies protection layer**	

F – Assesses, maintains and repairs roof — 14%

Task F-15 **Assesses roof condition** **30%**	**F-15.01 Performs roof inspections**	**F-15.02 Performs cut test**	**F-15.03 Determines maintenance or repair required**
Task F-16 **Maintains and repairs low slope roofing** **42%**	**F-16.01 Maintains low slope roofing**	**F-16.02 Repairs low slope roofing**	

Task F-17 Maintains and repairs steep slope roofing 28%	F-17.01 Maintains steep slope roofing	F-17.02 Repairs steep slope roofing

HARMONIZATION OF APPRENTICESHIP TRAINING

Provincial and territorial apprenticeship authorities are each responsible for their respective apprenticeship programs. In the spirit of continual improvement, and to facilitate mobility among apprentices in Canada, participating authorities have agreed to work towards harmonizing certain aspects of their programs where possible. After consulting with their stakeholders in the trade, they have reached consensus on the following elements. Note that implementation of these elements may vary from jurisdiction to jurisdiction, depending on their own circumstances. For more information on the implementation in any province and territory, please contact that jurisdiction's apprenticeship authority.

1. Trade name

The official Red Seal name for this trade is Roofer.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for this trade is three (3).

3. Total Training Hours During Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for this trade is 5400.

4. Sequencing Topics and Related Subtasks

The topic titles in the table below are placed in a column for each apprenticeship level for technical training. Each topic is accompanied by the subtasks and their reference number. The topics in the grey shaded cells represent those that are covered "in context" with other training in the subsequent years.

Level 1	Level 2	Level 3
	Context	Context
	Performs safety-related functions	Performs safety-related functions
	Common steep slope practices	Common steep slope practices
Performs safety-related functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment		

Level 1	Level 2	Level 3
Uses tools and equipment (Overview) 2.01 Uses hand tools 2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment 2.03 Uses hoisting, lifting and rigging equipment 2.04 Uses access equipment 2.05 Uses hot process equipment 2.06 Uses motorized equipment	**Uses tools and equipment (Task Specific)** 2.01 Uses hand tools 2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment 2.03 Uses hoisting, lifting and rigging equipment 2.04 Uses access equipment 2.05 Uses hot process equipment 2.06 Uses motorized equipment	**Uses tools and equipment (Task Specific)** 2.01 Uses hand tools 2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment 2.03 Uses hoisting, lifting and rigging equipment 2.04 Uses access equipment 2.05 Uses hot process equipment 2.06 Uses motorized equipment
Organizes work 3.01 Uses document ation and reference materials 3.02 Interprets blueprints and drawings 3.04 Assesses worksite conditions 3.05 Positions equipment and material on the ground and on the roof 3.06 Prepares material disposal systems	**Organizes work** 3.01 Uses documentation and reference materials 3.02 Interprets blueprints and drawings 3.04 Assesses worksite conditions 3.05 Positions equipment and material on the ground and on the roof 3.06 Prepares material disposal systems	**Organizes work** 3.02 Interprets blueprints and drawings 3.03 Estimates material 3.07 Evaluates roof conditions near roof-top equipment installations
Uses communication techniques 4.01 Uses communication techniques		**Uses communication and mentoring techniques** 4.01 Uses communication techniques 4.02 Uses mentoring techniques
Prepares roof for replacement 5.01 Protects surrounding area 5.02 Removes loose debris 5.03 Removes roofing and flashings	**Prepares roof for replacement** 5.04 Prepares roof substrate 5.05 Performs minor adjustments to penetrations, curbs and parapets	
Prepares deck for roof installation 6.02 Cleans surface of deck 6.04 Dries deck	**Prepares deck for roof installation** 6.01 Inspects deck 6.03 Verifies placement of roof penetrations, curbs and parapets	**Prepares deck for roof installation** 6.01 Inspects deck 6.03 Verifies placement of roof penetrations, curbs and parapets

Level 1	Level 2	Level 3
Applies low slope roofing components (Overview/Identification of Components) 7.01 Installs support panels 7.02 Primes substrate 7.03 Applies vapour retarder, vapour barrier and air barrier 7.04 Installs insulation 7.05 Installs cover board 7.06 Installs drains, vents, curbs and penetrations 7.07 Applies ballast, walkways and protective surfaces 7.08 Installs metal flashings	**Applies low slope roofing components** 7.01 Installs support panels 7.02 Primes substrate 7.03 Applies vapour retarder, vapour barrier and air barrier 7.04 Installs insulation 7.05 Installs cover board 7.06 Installs drains, vents, curbs and penetrations 7.07 Applies ballast, walkways and protective surfaces 7.08 Installs metal flashings	**Applies low slope roofing components (Trade Science/Installation of Components)** 7.01 Installs support panels 7.02 Primes substrate 7.03 Applies vapour retarder, vapour barrier and air barrier 7.04 Installs insulation 7.05 Installs cover board 7.06 Installs drains, vents, curbs and penetrations 7.07 Applies ballast, walkways and protective surfaces 7.08 Installs metal flashings
Applies low slope roofing membranes (BUR) 8.01 Relaxes membranes 8.02 Sets membranes 8.03 Applies membranes using hot-liquid process 8.06 Applies membranes using cold-applied methods 8.07 Applies membranes using mechanical fasteners 8.10 Installs membrane flashings 8.11 Installs temporary seals and temporary drains	**Applies low slope roofing membranes (Modified Bitumen)** 8.01 Relaxes membranes 8.02 Sets membranes 8.03 Applies membranes using hot-liquid process 8.04 Applies membranes using torched-on method 8.05 Applies membranes using hot-air welding 8.06 Applies membranes using cold-applied methods 8.07 Applies membranes using mechanical fasteners 8.10 Installs membrane flashings 8.11 Installs temporary seals and temporary drains	**Applies low slope roofing membranes (Thermoplastics, Thermosets, Liquid-applied, Trade Science)** 8.01 Relaxes membranes 8.02 Sets membranes 8.03 Applies membranes using hot-liquid process 8.05 Applies membranes using hot-air welding 8.06 Applies membranes using cold-applied methods 8.07 Applies membranes using mechanical fasteners 8.08 Applies loose-laid membranes 8.09 Applies liquid-applied membranes 8.10 Installs membrane flashings 8.11 Installs temporary seals and temporary drains

Level 1	Level 2	Level 3
Common steep slope practices 9.01 Installs steep slope underlayment 9.02 Installs steep slope venting 9.03 Installs steep slope valley applications 9.04 Installs steep slope saddles/crickets 9.05 Installs steep slope penetration flashings		
Applies shingles (Asphalt) 10.01 Determines layout of shingles 10.02 Installs starter strip and starter course 10.03 Fastens shingles 10.04 Cuts shingles 10.05 Tabs shingles 10.06 Installs metal flashings for shingled roofs	**Applies shingles (Wood and Composite)** 10.01 Determines layout of shingles 10.02 Installs starter strip and starter course 10.03 Fastens shingles 10.04 Cuts shingles 10.06 Installs metal flashings for shingled roofs	**Applies shingles (Metal)** 10.01 Determines layout of shingles 10.02 Installs starter strip and starter course 10.03 Fastens shingles 10.04 Cuts shingles 10.06 Installs metal flashings for shingled roofs
		Applies roof tiles 11.01 Installs battens/strapping for roof tiles 11.02 Fastens roof tiles 11.03 Cuts roof tiles 11.04 Installs closure strips for roof tiles 11.05 Installs ridge and hip caps 11.06 Installs metal flashings for tiled roofs
		Applies pre-formed metal roofing 12.01 Installs battens/strapping for pre-formed metal roofing 12.02 Fastens pre-formed metal roofing 12.03 Cuts sheet metal 12.04 Installs closure strips for pre-formed metal roofing 12.05 Installs snow guards 12.06 Installs metal flashings for pre-formed metal roofs

Level 1	Level 2	Level 3
	Waterproofs surfaces 13.01 Prepares waterproofing substrates 13.02 Applies waterproofing membrane	**Waterproofs surfaces** 13.03 Installs green, sustainable, vegetative and protected membrane components
	Damp-proofs surfaces 14.01 Applies damp-proofing materials 14.02 Applies protection layer	
		Assesses roof condition 15.01 Performs roof inspections 15.02 Performs cut test 15.03 Determines maintenance or repair required
	Maintains and repairs low slope roofing 16.01 Maintains low slope roofing 16.02 Repairs low slope roofing	**Maintains and repairs low slope roofing** 16.01 Maintains low slope roofing 16.02 Repairs low slope roofing
	Maintains and repairs steep slope roofing 17.01 Maintains steep slope roofing 17.02 Repairs steep slope roofing	**Maintains and repairs steep slope roofing** 17.01 Maintains steep slope roofing 17.02 Repairs steep slope roofing

MAJOR WORK ACTIVITY A

Performs common occupational skills

TASK A-1 Performs safety-related functions

TASK DESCRIPTOR

Roofers need to recognize and follow regulations and requirements such as jurisdictional safety regulations, Canadian Standards Association (CSA) and company policies to ensure workplace, public and individual safety.

A-1.01 Maintains safe work environment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.01.01P	attend tool box and site orientation meetings	tool box and site orientation meetings are attended
A-1.01.02P	perform job hazard assessment for ***safety requirements***	job hazard assessment is performed for ***safety requirements***
A-1.01.03P	identify ***hazards*** to appropriate site personnel	***hazards*** are reported to appropriate site personnel according to jurisdictional safety regulations
A-1.01.04P	position ***safety equipment***	***safety equipment*** is positioned according to jurisdictional regulations and company policies
A-1.01.05P	locate first aid kits and muster points	first aid kits and muster points are located
A-1.01.06P	set up barricades and signage	barricades and signage are set up to protect public and work areas
A-1.01.07P	perform ***housekeeping*** tasks	***housekeeping*** tasks are performed according to company policies and procedures
A-1.01.08P	use proper lifting techniques to unload equipment and materials	proper lifting techniques are used to unload equipment and materials
A-1.01.09P	use ***precautions*** to protect oneself and others from ***hazards of exposure to the elements***	***precautions*** to protect oneself and others from ***hazards of exposure to the elements*** are used

RANGE OF VARIABLES

safety requirements include: personal protective equipment (PPE), site-specific clothing requirement, safety equipment, specialty training

hazards include: spills, faulty equipment, obstructions, hazardous materials, fall from heights

safety equipment includes: water hoses, fire extinguishers, safety cones, caution tape, safety fence, warning (bump) lines, guardrails (permanent and temporary), first aid kits, eye wash stations, fall protection equipment

housekeeping includes: cleaning up, removing tripping hazards

precautions include: wearing thermal clothing, applying sunscreen, wearing hats, gloves and masks

hazards of exposure to the elements include: cold stress (frostbite, wind chill, hypothermia), heat stress (heat rash, sunburn, heat cramps, heat exhaustion, heat syncope [fainting], heat stroke)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.01.01L	demonstrate knowledge of safe work practices and procedures	describe company safety policies and procedures
		describe safe work practices, procedures and equipment
		describe ***unsafe work practices*** and risks associated with them
		identify regulations and company policies related to ***substance*** abuse
		describe good ***housekeeping*** practices
		describe reporting systems for safety issues
		describe importance of identifying location of ***safety equipment*** and muster points
		describe proper lifting techniques when unloading equipment and materials
A-1.01.02L	demonstrate knowledge of regulatory requirements pertaining to safety	identify and interpret health and safety ***regulations***
		identify training and certification requirements

RANGE OF VARIABLES

unsafe work practices include: working under the influence of drugs, alcohol, or lack of sleep

substances include: alcohol, legal drugs, prescription drugs (e.g. opioids), illegal drugs

housekeeping includes: cleaning up, removing tripping hazards

safety equipment includes: water hoses, fire extinguishers, safety cones, caution tape, safety fence, warning (bump) lines, guardrails (permanent and temporary), first aid kits, eye wash stations, fall protection equipment

regulations include: Workplace Hazardous Materials Information System (WHMIS), jurisdictional safety regulations

A-1.02 Uses personal protective equipment (PPE) and safety equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-1.02.01P	select and use ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are selected and used according to jurisdictional regulations, task and manufacturers' specifications
A-1.02.02P	inspect ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are inspected before each use to verify operating condition and that they are free from damage
A-1.02.03P	verify that ***PPE*** fits properly	***PPE*** is verified to ensure a proper fit according to CSA and manufacturers' specifications
A-1.02.04P	install and operate ***safety equipment***	***safety equipment*** is installed and operated according to CSA and manufacturers' specifications
A-1.02.05P	identify and remove from service worn, damaged and defective ***PPE*** and ***safety equipment***	worn, damaged and defective ***PPE*** and ***safety equipment*** are identified and removed from service according to CSA and manufacturers' specifications
A-1.02.06P	store ***PPE*** and ***safety equipment*** in designated area	***PPE*** and ***safety equipment*** are stored in designated area according to company policy and manufacturers' specifications

RANGE OF VARIABLES

PPE includes: hardhats, eye and face protection, respiratory protection, hearing protection, long-sleeved shirts, hand protection, foot protection, weather-appropriate clothing, cuff-less pants

safety equipment includes: water hoses, fire extinguishers, safety cones, caution tape, safety fence, warning (bump) lines, guardrails (permanent and temporary), first aid kits, eye wash stations, fall protection equipment

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-1.02.01L	demonstrate knowledge of ***PPE*** and ***safety equipment***, their applications, limitations, maintenance, storage and procedures for use	identify types of ***PPE*** and ***safety equipment*** and describe their applications, limitations, maintenance and storage
		describe operating procedures for ***PPE*** and ***safety equipment***

		describe procedures used to inspect, maintain and store ***PPE*** and ***safety equipment***
A-1.02.02L	demonstrate knowledge of regulatory requirements pertaining to ***PPE*** and ***safety equipment***	identify training requirements for ***PPE*** and ***safety equipment***
		identify and interpret jurisdictional safety regulations and responsibilities with respect to use of ***PPE*** and ***safety equipment***
		describe roles and responsibilities of employers and employees with respect to selection and use of ***PPE*** and ***safety equipment***
		describe workplace health and safety jurisdictional regulations related to use of ***PPE*** and ***safety equipment***

RANGE OF VARIABLES

PPE includes: hardhats, eye and face protection, respiratory protection, hearing protection, long-sleeved shirts, hand protection, foot protection, weather-appropriate clothing, cuff-less pants

safety equipment includes: water hoses, fire extinguishers, safety cones, caution tape, safety fence, warning (bump) lines, guardrails (permanent and temporary), first aid kits, eye wash stations, fall protection equipment

TASK A-2 Uses tools and equipment

TASK DESCRIPTOR

Roofers' ability to assemble, disassemble, use and maintain tools and equipment is essential to safely and efficiently completing job tasks.

A-2.01 Uses hand tools

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.01.01P	select and use ***hand tools***	***hand tools*** are selected and used according to task and manufacturers' specifications
A-2.01.02P	inspect and identify worn, damaged and defective ***hand tools***	worn, damaged and defective ***hand tools*** are identified and removed from service according to company policies
A-2.01.03P	clean and maintain ***hand tools***	***hand tools*** are cleaned and maintained according to manufacturers' specifications and company policies and procedures
A-2.01.04P	organize and store ***hand tools***	***hand tools*** are organized and stored in protected area

RANGE OF VARIABLES

hand tools include: See Appendix B (Tools and Equipment)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.01.01L	demonstrate knowledge of personal ***hand tools***, their applications, maintenance and procedures for use	define terminology associated with personal ***hand tools***
		identify hazards and describe safe work practices and procedures pertaining to use of ***hand tools***
		identify types of ***hand tools*** and describe their applications, maintenance and procedures for use
		identify criteria for replacement or repair of ***hand tools***

		describe procedures used to inspect ***hand tools***
A-2.01.02L	demonstrate knowledge of company-used and specialty ***hand tools***, their applications, maintenance and procedures for use	define terminology associated with company-used and specialty ***hand tools***

RANGE OF VARIABLES

hand tools include: See Appendix B (Tools and Equipment)

A-2.02 Uses power tools, pneumatic tools, and hot air welding, induction and fuelled equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.02.01P	select and use ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***	***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment*** are selected and used according to task and manufacturers' specifications
A-2.02.02P	inspect and identify worn, damaged and defective tools and equipment	worn, damaged and defective tools and equipment are identified and locked out/tagged out according to company policies
A-2.02.03P	monitor and maintain fuel and oil levels	fuel and oil levels are monitored and maintained according to manufacturers' specifications
A-2.02.04P	replace oil, hydraulic fluid, fuel, air filters and spark plugs	oil, hydraulic fluid, fuel, air filters and spark plugs are replaced according to manufacturers' specifications
A-2.02.05P	dispose of controlled and hazardous liquids and filters	controlled and hazardous liquids and filters are disposed of according to environmental and jurisdictional safety regulations

A-2.02.06P	clean and maintain ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***	***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment*** are cleaned and maintained according to maintenance procedures
A-2.02.07P	organize and store ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***	***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment*** are organized and stored in protected area

RANGE OF VARIABLES

power tools, pneumatic tools, and hot air welding, induction and fuelled equipment include: See Appendix B (Tools and Equipment)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.02.01L	demonstrate knowledge of ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***, their applications, maintenance and procedures for use	define terminology associated with ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***
		identify hazards and describe safe work practices and procedures pertaining to use of ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***
		identify types of ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment*** and describe their applications, maintenance and procedures for use
		identify criteria for replacement, maintenance or repair of ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***
		describe procedures used to inspect ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***
A-2.02.02L	demonstrate knowledge of regulatory requirements pertaining to ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***	identify standards, codes, regulations and certifications pertaining to ***power tools, pneumatic tools, and hot air welding, induction and fuelled equipment***

RANGE OF VARIABLES

power tools, pneumatic tools, and hot air welding, induction and fuelled equipment include: See Appendix B (Tools and Equipment)

A-2.03 Uses hoisting, lifting and rigging equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.03.01P	determine specific method required for ***hoisting, lifting and rigging equipment***	***hoisting, lifting and rigging equipment*** specific to site is determined
A-2.03.02P	select and use ***hoisting, lifting and rigging equipment***	***hoisting, lifting and rigging equipment*** is selected and used
A-2.03.03P	inspect, identify, tag and remove from service worn, damaged and defective ***hoisting, lifting and rigging equipment***	***hoisting, lifting and rigging equipment*** is inspected for damage and missing components, are tagged and removed from service according to jurisdictional safety regulations
A-2.03.04P	lubricate ***tools and equipment with moving parts***	***tools and equipment with moving parts*** are lubricated according to manufacturers' specifications
A-2.03.05P	assemble and disassemble ***hoist frame and components***	***hoist frame and components*** are assembled and disassembled according to manufacturers' specifications
A-2.03.06P	determine weight limitations for lift	weight limitations for lift are determined
A-2.03.07P	set up counterweights for ***hoist frame and components***	counterweights for ***hoist frame and components*** are calculated, placed and secured according to manufacturers' specifications and jurisdictional safety regulations
A-2.03.08P	position load to ensure centre of gravity and safe lift	centre of gravity of load is positioned according to pre-lift checks
A-2.03.09P	raise and lower equipment and materials using ***hoisting and rigging equipment***	equipment and materials are raised and lowered using ***hoisting and rigging equipment***
A-2.03.10P	position and secure load to ***hoisting and rigging equipment***	load is positioned and secured to ***hoisting and rigging equipment***
A-2.03.11P	establish and barricade lifting and lowering areas	lifting and lowering areas are established and barricaded
A-2.03.12P	protect roof membrane and substrate from counterweights and hoist frames	roof membrane and substrate are protected from counterweights and hoist frames
A-2.03.13P	communicate with personnel involved in lift	personnel involved in lift uses ***procedures used to communicate***

RANGE OF VARIABLES

hoisting, lifting and rigging equipment include: See Appendix B (Tools and Equipment)

tools and equipment with moving parts include: hoists, pulleys, hydraulic drives, bearings

hoist frame and components include: hoists, winches, motors, hoses, counterweights, clutch assemblies

procedures used to communicate include: hand signals, electronic communications, audible/visual

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.03.01L	demonstrate knowledge of ***hoisting, lifting and rigging equipment***, their applications, limitations and procedures for use	define terminology associated with ***hoisting, lifting and rigging equipment***
		identify types of ***hoisting, lifting and rigging equipment***, and components, and describe their characteristics, limitations and procedures for use
		identify ***factors to consider when selecting hoisting, lifting and rigging equipment***
A-2.03.02L	demonstrate knowledge of safe work practices and procedures pertaining to hoisting, lifting and rigging	identify ***hazards*** and describe safe work practices and procedures pertaining to use of ***hoisting, lifting and rigging equipment***
		describe ***procedures used to communicate*** during hoisting, lifting and rigging operations
		describe ***procedures used to ensure work area is safe*** for hoisting, lifting and rigging operations
A-2.03.03L	demonstrate knowledge of regulatory requirements pertaining to hoisting, lifting and rigging	identify standards, codes and regulations pertaining to hoisting, lifting and rigging

RANGE OF VARIABLES

hoisting, lifting and rigging equipment include: See Appendix B (Tools and Equipment)

factors to consider when selecting hoisting, lifting and rigging equipment include: load characteristics, environment, safety factors, anchor points, sling angles

hazards include: power lines, excess loads, ground conditions, overhead, environmental conditions, limitations

procedures used to communicate include: hand signals, electronic communications, audible/visual

procedures used to ensure work area is safe include: supervision of lift, securing work area, communication

A-2.04 Uses access equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.04.01P	select and use ***access equipment***	***access equipment*** is selected and used according to site conditions, job requirements, manufacturers' specifications and jurisdictional safety regulations
A-2.04.02P	inspect, identify, flag and remove from service worn, damaged and defective ***access equipment***	***access equipment*** is inspected for damage and missing components, and are flagged and removed from service according to jurisdictional regulations
A-2.04.03P	establish solid and level footing for ***access equipment***	solid and level footing for ***access equipment*** is established
A-2.04.04P	identify ***hazards*** when erecting ***access equipment***	***hazards*** are identified according to site conditions
A-2.04.05P	erect ***access equipment***	***access equipment*** is erected according to jurisdictional safety regulations
A-2.04.06P	secure ***access equipment*** to building	***access equipment*** is secured to building using ***access equipment securement***

RANGE OF VARIABLES

access equipment includes: See Appendix B (Tools and Equipment)
hazards include: power lines, uneven surfaces, pinch points
access equipment securement includes: wire rope, anchors, ratchet straps, chains, fasteners

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.04.01L	demonstrate knowledge of ***access equipment***, its applications, limitations and maintenance	describe terminology associated with ***access equipment***
		identify types of ***access equipment***, and describe their applications, limitations and maintenance
A-2.04.02L	demonstrate knowledge of procedures for use of ***access equipment***	identify ***hazards*** and describe safe work practices and procedures pertaining to use of ***access equipment***
		identify fall protection requirements
		describe safe angles of ladders
		describe three-point contact rule

		describe importance of being aware of ***worksite surroundings***
A-2.04.03L	demonstrate knowledge of regulatory requirements pertaining to use of ***access equipment***	identify and interpret regulations and certification requirements pertaining to use of ***access equipment***

RANGE OF VARIABLES

access equipment includes: See Appendix B (Tools and Equipment)
hazards include: power lines, uneven surfaces, pinch points
worksite surroundings include: trenching, pits, overhead hazards, drop-offs

A-2.05 Uses hot process equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.05.01P	select and use ***hot process equipment***	***hot process equipment*** is selected and used according to manufacturers' and job specifications
A-2.05.02P	inspect, identify and repair or tag out and remove from service worn, damaged and defective ***hot process equipment***	***hot process equipment*** is inspected for damage and repaired, or is tagged out and removed from service according to manufacturers' specifications
A-2.05.03P	connect and disconnect ***hot process equipment*** to fuel source	***hot process equipment*** is connected and disconnected to fuel source according to manufacturers' specifications and jurisdictional safety procedures
A-2.05.04P	check ***hot process equipment*** for moisture	***hot process equipment*** is checked for moisture before use
A-2.05.05P	remove moisture from ***hot process equipment***	moisture is removed from ***hot process equipment*** using mops, rags and torches
A-2.05.06P	fire up kettles, melters, tankers and torches	kettles, melters, tankers and torches are fired up according to company policy, safe work procedures and manufacturers' specifications
A-2.05.07P	fill kettles, melters and tankers	kettles, melters and tankers are filled according to company policy, safe work procedures and manufacturers' specifications
A-2.05.08P	keep bitumen clean	bitumen is kept clean by skimming heated material within kettle according to manufacturers' specifications

A-2.05.09P	maintain bitumen temperature	bitumen temperature is maintained according to asphalt type
A-2.05.10P	connect, brace and disconnect piping for asphalt	piping for asphalt is connected, braced and disconnected according to safe work procedures
A-2.05.11P	maintain ***hot process equipment***	***hot process equipment*** is maintained according to manufacturers' specifications
A-2.05.12P	store and secure ***hot process equipment***	***hot process equipment*** is stored and secured according to safe work procedures

RANGE OF VARIABLES

hot process equipment includes: See Appendix B (Tools and Equipment)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.05.01L	demonstrate knowledge of ***hot process equipment***, its applications, limitations and maintenance	describe terminology associated with ***hot process equipment***
		identify types of ***hot process equipment***, and describe their applications, limitations and maintenance
A-2.05.02L	demonstrate knowledge of procedures for use of ***hot process equipment***	identify hazards that describe under-filling and overheating kettles and melters
		identify equiviscous temperatures (EVT) and flashpoint temperatures in relation to type of asphalt being used
A-2.05.03L	demonstrate knowledge of regulatory requirements pertaining to use of ***hot process equipment***	identify and interpret jurisdictional regulations pertaining to use of ***hot process equipment***
		describe transportation regulations and CSA standards for handling and transporting propane cylinders and ***hot process equipment***

RANGE OF VARIABLES

hot process equipment includes: See Appendix B (Tools and Equipment)

A-2.06 Uses motorized equipment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.06.01P	select and use ***motorized equipment***	***motorized equipment*** is selected and used according to task and manufacturers' specifications
A-2.06.02P	inspect, maintain and repair, identify and tag out and remove from service worn, damaged and defective ***motorized equipment***	***motorized equipment*** is inspected for damage, maintained and repaired, or is tagged out and removed from service according to manufacturers' specifications
A-2.06.03P	perform minor adjustments for ***items***	minor adjustments are performed for ***items***
A-2.06.04P	perform job site assessment	job site assessment is performed for potential ***hazards***
A-2.06.05P	protect surrounding areas from flying debris	surrounding areas are protected from flying debris
A-2.06.06P	maintain ***motorized equipment***	***motorized equipment*** is maintained according to manufacturers' specifications
A-2.06.07P	store and secure ***motorized equipment***	***motorized equipment*** is stored and secured in protected designated area
A-2.06.08P	select and use ***specialized PPE***	***specialized PPE*** is selected and used

RANGE OF VARIABLES

motorized equipment includes: See Appendix B (Tools and Equipment)

items include: fluid levels, nuts and bolts, tire pressure

hazards include: loose nuts and bolts, exposed cutting blades, damaged guards, belts and chains, fractured housings and frames, worn brakes and engine parts, fuel

specialized PPE includes: face shields, hearing protection, form-fitted goggles, respirators, hand protection

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.06.01L	demonstrate knowledge of ***motorized equipment***, its applications, limitations and maintenance	describe terminology associated with ***motorized equipment***
		identify types of ***motorized equipment***, and describe their applications, limitations and maintenance

A-2.06.02L	demonstrate knowledge of procedures for use of ***motorized equipment***	identify ***hazards*** and describe safe work practices and procedures and manufacturers' specifications pertaining to use of ***motorized equipment***
A-2.06.03L	demonstrate knowledge of regulatory requirements pertaining to the use of ***motorized equipment***	identify and interpret regulations and certification requirements pertaining to the use of ***motorized equipment***
		describe transportation regulations and CSA standards for handling and transporting propane cylinders and hot process equipment

RANGE OF VARIABLES

motorized equipment includes: See Appendix B (Tools and Equipment)

hazards include: loose nuts and bolts, exposed cutting blades, damaged guards, belts and chains, fractured housings and frames, worn brakes and engine parts, fuel

TASK A-3 Organizes work

TASK DESCRIPTOR

In order to organize their work, roofers must be able to use documentation and reference materials, interpret blueprints and drawings, estimate materials, assess worksite conditions and optimally position equipment and materials on the roof and ground.

A well-organized job reduces costs, minimizes mistakes and ensures a productive and safe workplace.

A-3.01 Uses documentation and reference materials

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.01.01P	complete ***work-related documentation***	***work-related documentation*** is completed according to workplace policies, procedures and jurisdictional regulations
A-3.01.02P	fill out ***safety-related documentation***	***safety-related documentation*** is filled out according to workplace policies, procedures and jurisdictional safety regulations
A-3.01.03P	interpret ***reference materials***	***reference materials*** are interpreted according to industry standards

RANGE OF VARIABLES

work-related documentation includes: work orders, log books, time sheets

safety-related documentation includes: job hazard assessments, tool box meeting records, first aid logs, WHMIS, equipment inspection logs, written emergency procedures

reference materials include: manuals, drawings, design authority specifications, manufacturers' specifications, catalogues, technical and advisory bulletins, energy efficiency guides

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.01.01L	demonstrate knowledge of ***work-related*** and ***safety-related documentation***, and ***reference materials***, and their applications	define terminology associated with ***work-related*** and ***safety-related documentation***, and ***reference materials***
		identify types of ***work-related*** and ***safety-related documentation*****,** and ***reference materials*** and describe their applications
A-3.01.02L	demonstrate knowledge of procedures used to prepare ***work-related*** and ***safety-related documentation***	explain responsibilities associated with completing and signing ***work-related*** and ***safety-related documentation***
		describe procedures used to complete ***work-related*** and ***safety-related documentation***
A-3.01.03L	demonstrate knowledge of ***reference materials*** and their applications	identify types of ***reference materials*** and describe their applications
A-3.01.04L	demonstrate knowledge of regulatory requirements pertaining to ***work-related*** and ***safety-related documentation***, and ***reference materials***	identify ***codes, standards, rules and regulations*** pertaining to ***work-related*** and ***safety-related documentation***, and ***reference materials***

RANGE OF VARIABLES

work-related documentation includes: work orders, log books, time sheets

safety-related documentation includes: job hazard assessments, tool box meeting records, first aid logs, WHMIS, equipment inspection logs, written emergency procedures

reference materials include: manuals, drawings, design authority specifications, manufacturers' specifications, catalogues, technical and advisory bulletins, energy efficiency guides

codes, standards, rules and regulations include: National Building Code (NBC), CSA, Canadian Roofing Contractors Association (CRCA), jurisdictional codes and regulations, site-specific requirements, jurisdictional safety regulations, environmental protection regulations and guidelines

A-3.02 Interprets blueprints and drawings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.02.01P	locate and interpret ***information*** on ***blueprints and drawings***	***information*** on blueprints is located and interpreted
A-3.02.02P	interpret lines and symbols on ***blueprints and drawings***	lines and symbols are interpreted on ***blueprints and drawings***
A-3.02.03P	scale ***blueprints and drawings***	***blueprints and drawings*** are scaled using ***tools***
A-3.02.04P	estimate work take-offs from blueprints	take-offs are estimated from blueprints
A-3.02.05P	identify discrepancies on blueprints	discrepancies are identified on blueprints
A-3.02.06P	cross-reference ***components*** of blueprints	blueprint ***components*** are cross-referenced

RANGE OF VARIABLES

information includes: section and detail views, elevations

blueprints and drawings include: digital, paper, shop drawings, as-built drawings

tools include: calculators, scale ruler, computer software, apps, satellite maps

components include: major (architectural, structural, electrical, mechanical), minor (cross-section, plans, elevations, details)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-3.02.01L	demonstrate knowledge of ***blueprints and drawings***, and their applications	define terminology associated with ***blueprints and drawings***
		identify types of ***blueprints and drawings*** and their ***components***, and describe their applications
		identify ***information*** found on ***blueprints and drawings***, and describe their purpose and applications
		identify and interpret common symbols and abbreviations found on ***blueprints and drawings***
		describe metric and imperial systems of measurement

A-3.02.02L	demonstrate knowledge of procedures used to interpret and extract information from ***blueprints and drawings*** and their ***components***	interpret and extract information from ***blueprints and drawings*** and their ***components***
		explain purpose of ***blueprints and drawings*** and their ***components***

RANGE OF VARIABLES

blueprints and drawings include: digital, paper, shop drawings, as-built drawings

components include: major (architectural, structural, electrical, mechanical), minor (cross-section, plans, elevations, details)

information includes: section and detail views, elevations

A-3.03 Estimates material

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
A-3.03.02P	convert between metric and imperial measurements	metric and imperial measurements are converted
A-3.03.03P	calculate area and lineal measurements	area and lineal measurements are calculated
A-3.03.04P	calculate ***material*** coverage	***material*** coverage is calculated to manufacturers' specifications
A-3.03.05P	calculate volume and weight of old materials for disposal	volume and weight of old materials for disposal are calculated
A-3.03.06P	determine access points for access, removal and roofing	access points for removal and roofing are determined

RANGE OF VARIABLES

tools and equipment include: calculators, computer software, measuring tapes

materials include: membranes, felt, insulation, shingles, panels, adhesives, fasteners, primers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.03.01L	demonstrate knowledge of procedures used to estimate ***materials***	identify types of ***tools and equipment*** used to estimate ***materials***
A-3.03.02L	demonstrate knowledge of mathematical calculations required to estimate ***materials***	calculate area and lineal measurements
		calculate ***material*** coverage
		convert between metric and imperial measurements
		calculate volume and weight of old materials for disposal

RANGE OF VARIABLES

materials include: membranes, felt, insulation, shingles, panels, adhesives, fasteners, primers
tools and equipment include: calculators, computer software, measuring tapes

A-3.04 Assesses worksite conditions

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.04.01P	determine access and egress requirements of work area	access and egress requirements of work area are determined
A-3.04.02P	conduct job assessment to identify ***hazards***	job assessment is conducted to identify ***hazards***
A-3.04.03P	assess ***problems and unsafe areas*** on roof	***problems and unsafe areas*** on roof are assessed
A-3.04.04P	identify and document ***pre-existing conditions***	***pre-existing conditions*** are identified and documented to eliminate fault and litigation
A-3.04.05P	assess ***fall protection requirements***	***fall protection requirements*** are assessed
A-3.04.06P	identify accessibility of ***onsite utilities***	accessibility of ***onsite utilities*** is identified
A-3.04.07P	determine material disposal system requirements	material disposal system requirements are determined
A-3.04.08P	add or remove roof projections	roof projections are added or removed according to site specifications

A-3.04.09P	determine work plan in relation to weather forecast and environmental conditions	work plan is determined in relation to weather forecast and environmental conditions
A-3.04.10P	determine installation plan for roof assembly in relation to environmental conditions	roof assembly installation is determined by environmental conditions

RANGE OF VARIABLES

hazards include: general public, un-level ground, overhead power lines, heavy equipment, other trades' activities, mechanical and electrical components, insects and pest animals

problems and unsafe areas include: windows, skylights, mechanical equipment, air intakes, uncovered openings

pre-existing conditions include: broken windows, stains, spills, damaged siding, interior damage, location of mechanical and electrical components

fall protection requirements include: scaffolding, safety railings, control zones, harness, lanyard, rope grab, anchor systems

onsite utilities include: water and electrical outlets, washroom facilities, first aid stations

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.04.01L	demonstrate knowledge of procedures used to assess worksite conditions	describe procedures used to determine access and egress requirements of work area
		describe procedures used to determine starting and finishing points
		identify adequate curb and parapet elevation
		describe procedures used to conduct a job assessment for ***hazards***, ***problems and unsafe areas***
		describe procedures used to determine ***fall protection requirements***
		describe procedures used to determine ***onsite utilities***
A-3.04.02L	demonstrate knowledge of procedures used to add or remove roof projections	describe procedures used to add or remove roof projections

RANGE OF VARIABLES

hazards include: general public, un-level ground, overhead power lines, heavy equipment, other trades' activities, mechanical and electrical components, insects and pest animals

problems and unsafe areas include: windows, skylights, mechanical equipment, air intakes, uncovered openings

fall protection requirements include: scaffolding, safety railings, control zones, harness, lanyard, rope grab, anchor systems

onsite utilities include: water and electrical outlets, washroom facilities, first aid stations

A-3.05 Positions equipment and material on the ground and on the roof

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.05.01P	place asphalt kettles, melters and tankers away from windows, doors and ventilation	asphalt kettles, melters and tankers are placed away from windows, doors and ventilation when possible
A-3.05.02P	place roof top hoist on roof	roof top hoist is placed on roof to facilitate lifting of equipment and materials according to site specifications
A-3.05.03P	distribute weight of equipment and material equally across ***structural supports***	weight distribution of equipment and material is distributed equally across ***structural supports*** according to building design
A-3.05.04P	load and place materials in strategic sequence	materials are loaded and placed in strategic sequence to facilitate installation process
A-3.05.05P	elevate material off ground and roof	material is elevated off ground and roof to protect from moisture using dunnage
A-3.05.06P	select ***temporary covers*** to protect equipment and materials from ***environmental conditions***	***temporary covers*** are selected to protect equipment and materials from ***environmental conditions***
A-3.05.07P	secure and cover equipment and materials with ***temporary covers***	equipment and materials are secured and covered with ***temporary covers*** using ***devices or hardware***
A-3.05.08P	limit repositioning of material and foot traffic	repositioning of material and foot traffic is limited to prevent damage to roofing systems

RANGE OF VARIABLES

structural supports include: joists, trusses
temporary covers include: tarps, polyethylene, cargo net, secured plywood
environmental conditions include: wind, rain, ultraviolet (UV) exposure, snow
devices or hardware include: ropes, tie-down straps, fasteners, shrink wrap, ballast

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.05.01L	demonstrate knowledge of procedures used to position equipment and material on ground and on roof	identify types of equipment and material that need to be positioned on a job site
		describe types of ***temporary covers*** used to protect equipment and material from ***environmental conditions***
		describe importance of sequencing removal and installation of equipment and material
		describe importance of weight distribution over ***structural supports*** when placing equipment and material on roof
		describe importance of considering ventilation openings when positioning equipment and material
A-3.05.02L	demonstrate knowledge of regulatory requirements pertaining to the securement and placement of equipment and material on ground and on roof	identify standards, codes and regulations pertaining to the securement and positioning of equipment and material on ground and on roof

RANGE OF VARIABLES

temporary covers include: tarps, polyethylene, cargo net, secured plywood
environmental conditions include: wind, rain, ultraviolet (UV) exposure, snow
structural supports include: joists, trusses

A-3.06 Prepares material disposal systems

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.06.01P	assemble and disassemble ***material disposal systems***	***material disposal systems*** are assembled and disassembled according to manufacturers' specifications
A-3.06.02P	set up ***material disposal systems***	***material disposal systems*** are set up in locations according to job site assessment

A-3.06.03P	place counterweights	counterweights are placed according to jurisdictional safety regulations and manufacturers' instructions
A-3.06.04P	position trucks and garbage bins	trucks and garbage bins are positioned according to ***material disposal system*** location

RANGE OF VARIABLES

material disposal systems include: garbage chutes, hoppers, hoist bags, metal skip

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.06.01L	demonstrate knowledge of ***material disposal systems***, their ***components***, characteristics and applications	define terminology associated with ***material disposal systems*** and their ***components***
		identify types of ***material disposal systems*** and their ***components***, and describe their characteristics and applications
A-3.06.02L	demonstrate knowledge of procedures used to prepare ***material disposal systems*** and their ***components***	describe procedures used to assemble and disassemble ***material disposal systems***
		describe importance of recycling used material
		describe implications of hazardous used material
A-3.06.03L	demonstrate knowledge of regulatory requirements pertaining to the use of ***material disposal systems*** and their ***components***	identify standards, codes and regulations pertaining to the use of ***material disposal systems*** and their ***components***

RANGE OF VARIABLES

material disposal systems include: garbage chutes, hoppers, hoist bags, metal skip

components include: wheelbarrows, garbage bags, chutes, disposal bins, outriggers, counterweights, motorized power buggy

A-3.07 Evaluates roof conditions near rooftop equipment installations

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.07.01P	identify type of ***specialty rooftop equipment***	type of ***specialty rooftop equipment*** is identified
A-3.07.02P	inspect roof for ***factors***	roof is inspected for ***factors***
A-3.07.03P	conduct survey, cut test or core sample	survey, cut test or core sample is conducted to determine if underlying roof components are in good condition
A-3.07.04P	ensure building structure was reviewed by a professional engineer	building structure is reviewed by a professional engineer to ensure that it is suitable for loads imposed by ***specialty rooftop equipment***
A-3.07.05P	consult ***specialty rooftop equipment*** design authority in compliance with national and jurisdictional regulatory bodies	***specialty rooftop equipment*** design authority is consulted for compliance with national and jurisdictional regulatory bodies
A-3.07.06P	seal roof projections for mounting hardware and electrical equipment	roof projections for mounting hardware and electrical equipment are sealed to avoid any future water penetration
A-3.07.07P	ensure roofing assemblies used as substrates incorporate ***design enhancements***	roofing assemblies used as substrates incorporate ***design enhancements***
A-3.07.08P	consult with ***specialty rooftop equipment*** design authority when roof repairs are required	***specialty rooftop equipment*** design authority is consulted when roof repairs are required to ensure integrity of system is maintained
A-3.07.09P	inspect ***roofing assembly components*** after ***specialty rooftop equipment*** have been serviced or repaired	***roofing assembly components*** are inspected for damages after ***specialty rooftop equipment*** have been serviced or repaired
A-3.07.10P	repair ***roofing assembly components***	***roofing assembly components*** are repaired as required

RANGE OF VARIABLES

specialty rooftop equipment includes: cable trays, fiber optic systems, photovoltaic (PV)

factors include: age of roof, condition of roof, hazards, moisture, proximity, spacing, substrate composition and surface condition

design enhancements include: roof area drains independently and has a positive slope; increased compressive strength of insulation and cover boards; dedicated walkways installed for installation and future maintenance of rooftop systems; roof design withstands foot and equipment traffic

roofing assembly components include: support, sheet metal rain collar with draw band, sheet metal flashing collar

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.07.01L	demonstrate knowledge of ***specialty rooftop equipment*** and their ***components***, their characteristics and applications	define terminology associated with ***specialty rooftop equipment*** and their ***components***
		identify types of ***specialty rooftop equipment*** and describe their characteristics and applications
		describe ***factors*** that need to be considered before installation of ***specialty rooftop equipment***
		identify ***design enhancements*** that roofing assemblies used as substrates should incorporate before installation of ***specialty rooftop equipment***
		identify types of rack-mounted systems installation methods and describe their characteristics and applications
		describe methods to inspect ***roofing assembly components***
		describe methods to repair ***roofing assembly components***

RANGE OF VARIABLES

specialty rooftop equipment includes: cable trays, fiber optic systems, photovoltaic (PV)

specialty rooftop equipment components include: inverters, disconnects, wiring, sleepers, up-stands, pedestals, pipe boots, penetration pockets

factors include: age of roof, condition of roof, hazards, moisture, proximity, spacing, substrate composition and surface condition

design enhancements include: roof area drains independently and has a positive slope; increased compressive strength of insulation and cover boards; dedicated walkways installed for installation and future maintenance of rooftop systems; roof design withstands foot and equipment traffic

roofing assembly components include: support, sheet metal rain collar with draw band, sheet metal flashing collar

TASK A-4 Uses communication and mentoring techniques

TASK DESCRIPTOR

Learning in the trades is done primarily in the workplace with tradespeople passing on their skills and knowledge to apprentices, as well as sharing knowledge among themselves. Apprenticeship is, and always has been about mentoring – learning workplace skills and passing them on. Because of the importance of this to the trade, this task covers the activities related to communication in the workplace and mentoring skills.

A-4.01 Uses communication techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.01.01P	demonstrate communication practices with individuals or in a group	instructions and messages are interpreted by all parties involved in communication
A-4.01.02P	listen using ***active listening*** practices	***active listening*** practices are utilized
A-4.01.03P	receive and respond to feedback on work	response to feedback indicates understanding and corrective measures are taken
A-4.01.04P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-4.01.05P	use questioning to improve communication	questions enhance understanding, on-the-job training and goal setting
A-4.01.06P	participate in safety and information meetings	meetings are attended, information is relayed to the workforce, and is applied

RANGE OF VARIABLES

active listening includes: hearing, interpreting, reflecting, responding, paraphrasing, comprehending

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.01.01L	demonstrate knowledge of trade terminology	define terminology used in trade
A-4.01.02L	demonstrate knowledge of effective communication practices	describe importance of using effective verbal and non-verbal communication with ***people in the workplace***
		identify ***sources of information*** to effectively communicate
		identify communication and ***learning styles***

	describe effective listening and speaking skills
	describe effective conflict resolution skills
	identify ***personal responsibilities and attitudes*** that contribute to on-the-job success
	identify value of diversity in workplace
	identify communication that constitutes bullying, ***harassment*** and ***discrimination***

RANGE OF VARIABLES

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, clients, authorities having jurisdiction (AHJ), manufacturers, general public

sources of information include: regulations, codes, occupational health and safety requirements, AHJ requirements, prints, drawings, specifications, company and client documentation, roofing associations

learning styles include: seeing it, hearing it, doing it

personal responsibilities and attitudes include: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practice

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient

discrimination is prohibited based on: race, national or ethnic origin, colour, religion, age, sex, sexual orientation, gender identity or expression, marital status, family status, disability, genetic characteristics, pardoned conviction

A-4.02 Uses mentoring techniques

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-4.02.01P	identify and communicate learning objective and point of lesson	apprentice or learner can explain objective and point of lesson
A-4.02.02P	link lesson to other lessons and job	lesson order and unplanned learning opportunities are defined
A-4.02.03P	demonstrate performance of a skill to an apprentice or learner	***steps required to demonstrate a skill*** are performed
A-4.02.04P	set up conditions required for an apprentice or learner to practice a skill	***practice conditions*** are set up so that skill can be practiced safely by apprentice or learner

A-4.02.05P	assess apprentice or learner's ability to perform tasks with increasing independence	performance of apprentice or learner improves with practice to a point where skill can be done with little supervision
A-4.02.06P	give supportive and corrective feedback	apprentice or learner adopts best practice after having been given supportive or corrective feedback
A-4.02.07P	support apprentices or learners in pursuing technical training opportunities	technical training is completed within timeframe prescribed by apprenticeship authority
A-4.02.08P	support anti-***harassment*** in the workplace	workplace is ***harassment-*** and ***discrimination***-free
A-4.02.09P	assess apprentice or learner suitability to trade during probationary period	apprentice or learner is given feedback that helps them identify their own strengths and weaknesses and suitability for trade

RANGE OF VARIABLES

steps required to demonstrate a skill include: understanding the who, what, where, when, why, and how, explaining, showing, giving encouragement, following up to ensure skill is performed correctly

practice conditions mean: guided, limited independence, full independence

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to recipient

discrimination is prohibited based on: race, national or ethnic origin, colour, religion, age, sex, sexual orientation, gender identity or expression, marital status, family status, disability, genetic characteristics, pardoned conviction

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.02.01L	demonstrate knowledge of strategies for learning skills in the workplace	describe importance of individual experience
		describe shared responsibilities for workplace learning
		determine one's own learning preferences and explain how these relate to learning new skills
		describe importance of different types of skills in the workplace
		describe importance of ***essential skills*** in workplace
		identify different ***learning styles***
		identify different ***learning needs*** and strategies to meet them
		identify ***strategies to assist in learning a skill***
A-4.02.02L	demonstrate knowledge of strategies for ***teaching*** workplace ***skills***	identify different roles played by a workplace mentor
		describe ***teaching skills***

	explain the importance of identifying point of a lesson
	identify how to choose a good time to present a lesson
	explain importance of linking lessons
	identify components of skill (the context)
	describe considerations in setting up opportunities for skill practice
	explain the importance of providing feedback
	identify techniques for giving effective feedback
	describe a skills assessment
	identify methods of assessing progress
	explain how to adjust a lesson to different situations

RANGE OF VARIABLES

essential skills are: reading, document use, writing, oral communication, numeracy, thinking, working with others, digital technology, continuous learning

learning styles include: seeing it, hearing it, trying it

learning needs include: learning disabilities, learning preferences, language proficiency

strategies to assist in learning a skill include: understanding the basic principles of instruction, developing coaching skills, being mature and patient, providing feedback

teaching skills include: identifying point of lesson, linking lesson, demonstrating skill, providing practice, giving feedback, assessing skills and progress

MAJOR WORK ACTIVITY B
Prepares roof and deck

TASK B-5 Prepares roof for replacement

TASK DESCRIPTOR

Roofers prepare a specific area of the roof to facilitate the removal of the existing roofing system and to ensure the replacement system can be installed efficiently.

B-5.01 Protects surrounding area

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-5.01.01P	identify ***areas*** where damage may occur from reroofing process	***areas*** where damage may occur from reroofing process are identified
B-5.01.02P	verify air intake mechanical equipment is shut off as required	air intake mechanical equipment is shut off as required to prevent fumes from entering building
B-5.01.03P	verify rooftop gas and electrical lines are disconnected or powered down when required	rooftop gas and electrical lines are disconnected or powered down when required
B-5.01.04P	select ***temporary covers*** to protect items	***temporary covers*** are selected according to items being protected
B-5.01.05P	select and use ***devices or hardware*** to secure ***temporary covers***	***devices or hardware*** are selected to secure ***temporary covers*** according to items being protected

RANGE OF VARIABLES

areas include: windows, walls, skylights, photovoltaic panels, mechanical equipment, parking lots, entrances, exits, public property

temporary covers include: tarps, polyethylene, safety nets, plywood, powerline protection, interior ceiling containment

devices or hardware include: tapes, ropes, tie-down straps, fasteners, shrink wrap, ratchet straps

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-5.01.01L	demonstrate knowledge of procedures to protect surrounding areas for reroofing process	describe ***areas*** where damage may occur from reroofing process
		identify types of ***temporary covers*** used to protect items
		identify types of ***devices or hardware*** used to secure ***temporary covers***
		describe importance of shutting down utilities in work area
		identify ***damages*** that could result in not protecting areas properly

RANGE OF VARIABLES

areas include: windows, walls, skylights, photovoltaic panels, mechanical equipment, parking lots, entrances, exits, public property

temporary covers include: tarps, polyethylene, safety nets, plywood, powerline protection, interior ceiling containment

devices or hardware include: tapes, ropes, tie-down straps, fasteners, shrink wrap, ratchet straps

damages include: broken glass, fumes, dust and debris infiltration, staining, fire, water, landscaping, building interior components

B-5.02 Removes loose debris

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-5.02.01P	identify ***debris*** to be removed	***debris*** to be removed is identified
B-5.02.02P	select ***removal device***	***removal device*** is selected according to ***debris*** that needs to be removed
B-5.02.03P	gather, store and dispose of ***debris***	***debris*** is gathered, stored and disposed of in designated containers according to environmental and jurisdictional regulations
B-5.02.04P	identify ***hazardous materials***	***hazardous materials*** are identified, and client and project authority notified

RANGE OF VARIABLES

debris includes: vegetation, ballast/aggregate, organic and inorganic waste

removal devices include: shovels, brooms, power vacuums, wheelbarrows, power sweeper, power carts

hazardous materials include: asbestos materials, lead, mould, droppings/feces, coal tar pitch, used needles

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-5.02.01L	demonstrate knowledge of procedures to remove loose ***debris***	describe procedure to remove loose ***debris***
		identify types of loose ***debris*** and ***hazardous materials*** that may need to be removed
		identify types of ***removal devices*** used to remove loose ***debris***
		identify types of containers used to gather, store and dispose of loose ***debris***
B-5.02.02L	demonstrate knowledge of regulatory requirements pertaining to disposal of ***hazardous materials***	identify standards, codes and regulations pertaining to gathering, storing and disposal of ***hazardous materials***

RANGE OF VARIABLES

debris includes: vegetation, ballast/aggregate, organic and inorganic waste

hazardous materials include: asbestos materials, lead, mould, droppings/feces, coal tar pitch, used needles

removal devices include: shovels, brooms, power vacuums, wheelbarrows, power sweeper, power carts

B-5.03 Removes roofing and flashings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-5.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and type of roof
B-5.03.02P	identify ***potential hazards***	***potential hazards*** are identified
B-5.03.03P	select removal technique	removal technique is selected according to type and size of roof
B-5.03.04P	remove ***components***	***components*** are removed according to industry practices
B-5.03.05P	select ***refuse disposal method***	***refuse disposal method*** is selected according to height of roof

B-5.03.06P	gather, store and dispose of debris	debris is gathered, stored and disposed of in designated containers according to environmental and jurisdictional regulations
B-5.03.07P	install ***temporary drainage***	***temporary drainage*** is installed in work area according to product being installed and task
B-5.03.08P	seal roof temporarily using ***materials***	roof is temporarily sealed using ***materials*** in event of sudden weather changes or deteriorated roof decks

RANGE OF VARIABLES

tools and equipment include: pry-bars, hammers, stripping spades, roof cutters, axes, tear-off machine, shovels, magnetic bar

potential hazards include: deteriorated deck, fasteners, electrical wiring, gas and service lines, roof openings

components include: flashings, ballast, membranes, shingles, clamping rings, insulation, construction materials

refuse disposal method includes: garbage chute, hoisted garbage box

temporary drainage includes: drop drains, emergency scuppers, pumps

materials include: polyethylene, compatible membrane, mastics, tarps

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-5.03.01L	demonstrate knowledge of roofing systems and their ***components***, characteristics and applications	define terminology associated with roofing systems and their ***components***
		identify ***types of roofing systems*** and their ***components***, and describe their characteristics and applications
B-5.03.02L	demonstrate knowledge of procedures to remove roofing and flashings	identify ***tools and equipment*** used to remove roofing and flashings, and describe their procedures for use
		describe procedures to remove roofing and flashings
		identify types of ***materials*** used to seal a roof temporarily
		describe procedures for installing ***temporary drainage*** in a work area
		describe effects of environmental conditions and its impacts on removal of roof coverings
		explain roof removal sequence
		explain roof removal techniques

	identify ***potential hazards*** while removing roof and flashing
	describe procedures for removal and disposal of materials

RANGE OF VARIABLES

components include: flashings, ballast, membranes, shingles, clamping rings, insulation, construction materials

types of roofing systems include: low slope, steep slope

tools and equipment include: pry-bars, hammers, stripping spades, roof cutters, axes, tear-off machine, shovels, magnetic bar

materials include: polyethylene, compatible membrane, mastics, tarps

temporary drainage includes: drop drains, emergency scuppers, pumps

potential hazards include: deteriorated deck, fasteners, electrical wiring, gas and service lines, roof openings

B-5.04 Prepares roof substrate

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-5.04.01P	verify that ***roof substrate*** is clean and free of protruding fasteners and foreign materials	***roof substrate*** is clean and free of protruding fasteners and foreign materials
B-5.04.02P	verify ***roof substrate*** is securely fastened	***roof substrate*** is securely fastened
B-5.04.03P	visually inspect ***roof substrate*** for ***defects***	***roof substrate*** is visually inspected for ***defects***
B-5.04.04P	identify ***structural damage***	***structural damage*** is identified
B-5.04.05P	install temporary barricade	temporary barricade is installed to maintain integrity of work space
B-5.04.06P	repair and replace damaged ***roof substrate***	damaged ***roof substrate*** is repaired and replaced according to NBC

RANGE OF VARIABLES

roof substrates include: decks (wood, steel, concrete), existing roof composition (insulation, cover boards, membranes, membrane flashings)

defects include: gouges, wet insulation, dents, voids, rot, spalling concrete, corrosion, holes, protruding fasteners

structural damage includes: rusted metal deck, rotten wood deck

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-5.04.01L	demonstrate knowledge of ***roof substrates*** and their ***components***, characteristics and applications	define terminology associated with ***roof substrates*** and their ***components***
		identify types of ***roof substrates*** and their ***components***, and describe their characteristics and applications
B-5.04.02L	demonstrate knowledge of procedures to prepare ***roof substrates***	describe procedures to prepare ***roof substrates***
		identify types of ***structural damage***
		identify types of roof substrate ***defects***
		describe procedures to repair and replace damaged ***roof substrate***
		describe procedures to secure loose ***roof substrate components***

RANGE OF VARIABLES

roof substrates include: decks (wood, steel, concrete), existing roof composition (insulation, cover boards, membranes, membrane flashings)

roof substrate components include: insulation, cover boards, membranes, membrane flashings

structural damage includes: rusted metal deck, rotten wood deck

defects include: gouges, wet insulation, dents, voids, rot, spalling concrete, corrosion, holes, protruding fasteners

B-5.05 Performs minor adjustments to penetrations, curbs and parapets

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-5.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
B-5.05.02P	verify thickness of new roofing system	thickness of new roofing system is verified to ensure penetration, curb and parapet elevation requirements are according to design authority specifications

B-5.05.03P	verify elevations of existing penetrations, curbs and parapets	elevations of existing penetrations, curbs and parapets are verified to determine if adjustments are required according to design authority and manufacturers' specifications
B-5.05.04P	verify if other trades are required to facilitate raising of penetrations, curbs and parapets	raising of penetrations, curbs and parapets is determined according to new roof thickness and site authority is notified of required changes
B-5.05.05P	select and install ***materials*** to extend elevations of penetrations, curbs and parapets	***materials*** to extend elevations of penetrations, curbs and parapets are selected and installed according to field measurements and design authority specifications
B-5.05.06P	check roof drains	roof drains are checked to ensure they are at low point and to facilitate positive drainage
B-5.05.07P	alter height of drain	height of drain is altered using a retrofit drain or existing drain assembly to ensure they are at low point and to facilitate positive drainage

RANGE OF VARIABLES

tools and equipment include: hammers, saws, drills

materials include: dimensional lumber, plywood, site-specific plumbing materials, fasteners

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-5.05.01L	demonstrate knowledge of penetrations, curbs and parapets, their characteristics and applications	define terminology associated with penetrations, curbs and parapets
		identify penetrations, curbs and parapets, and describe their characteristics and applications
B-5.05.02L	demonstrate knowledge of procedures to perform minor adjustments to penetrations, curbs and parapets	identify ***tools and equipment*** used to perform minor adjustments to penetrations, curbs and parapets, and describe their procedures for use
		describe procedures used to perform minor adjustments to penetrations, curbs and parapets
		describe calculations used to determine thickness of new roofing system

	identify ***materials*** used to extend elevations of penetrations, curbs and parapets
	describe procedures to alter height of drains

RANGE OF VARIABLES

tools and equipment include: hammers, saws, drills
materials include: dimensional lumber, plywood, site-specific plumbing materials, fasteners

TASK B-6 Prepares deck for roof installation

TASK DESCRIPTOR

Before installing a new roofing system or replacing an older roofing system, roofers need to ensure that the deck is clean, dry, free of defects and secured in place. The performance of the roof depends on the integrity of the deck and its components. Decks need to be prepared for roof replacement and for new construction.

B-6.01 Inspects deck

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-6.01.01P	visually inspect deck for ***defects*** and determine if clean-up or repairs are required	***defects***, clean-up or repairs are identified, determined and documented according to NBC
B-6.01.02P	determine responsibility for clean-up or repairs	responsibility for clean-up or repairs is determined according to contract
B-6.01.03P	verify deck is fully cured, secured and crimped, or fastened	deck is verified to be fully cured, secured and crimped, or fastened according to visual inspection and authority sign-off
B-6.01.04P	verify uncut deck openings are clearly marked	uncut deck openings are clearly marked and communicated to contractor or other trades according to design authority specifications
B-6.01.05P	verify existing deck openings are fully supported and securely covered	existing deck openings are fully supported and securely covered according to NBC

RANGE OF VARIABLES

defects include: deterioration, irregularities, deflection of deck, uncured and spalling concrete, corrosion

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-6.01.01L	demonstrate knowledge of roof decks, their characteristics and applications	define terminology associated with roof decks
		identify ***types of roof decks***, and describe their characteristics and applications
B-6.01.02L	demonstrate knowledge of procedures to inspect deck	identify types of roof deck ***defects*** and their effects on roof performance
		describe inspection requirements

RANGE OF VARIABLES

types of roof decks include: wood, concrete, steel, asbestos
defects include: deterioration, irregularities, deflection of deck, uncured and spalling concrete, corrosion

B-6.02 Cleans surface of deck

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-6.02.01P	determine amount of deck to be cleaned	amount of deck to be cleaned is determined according to amount of roofing to be installed that day considering ***factors***
B-6.02.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to cleaning technique
B-6.02.03P	remove ***materials***	***materials*** are removed and placed in designated area
B-6.02.04P	remove ***debris***	***debris*** is removed to a designated disposal bin or area
B-6.02.05P	remove and dispose of ***contaminants***	***contaminants*** are removed and disposed of according to WHMIS
B-6.02.06P	limit access to cleaned area	access to cleaned area is limited using ***barriers***

RANGE OF VARIABLES

factors include: environmental conditions, labour, other trades, new roof or re-roof
tools and equipment include: shovels, brooms, rags, air compressors, blowers, scrapers
materials include: insulation, membranes, fasteners, z-girt
debris includes: paper, sawdust, concrete, aggregate, construction materials
contaminants include: grease, oil, adhesive spills
barriers include: ropes, delineators, plastic cones, caution tape

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-6.02.01L	demonstrate knowledge of roof decks, their characteristics and applications	identify ***types of roof decks***, and describe their characteristics and applications
B-6.02.02L	demonstrate knowledge of procedures to clean roof decks	identify ***tools and equipment*** used to clean roof decks, and describe their procedures for use
		describe procedures to clean roof decks
		determine when, how much, and extent of cleaning required
		describe procedures used to remove and dispose of ***contaminants***
		describe types of ***barriers*** used to limit access to cleaned areas

RANGE OF VARIABLES

types of roof decks include: wood, concrete, steel, Stramit, asbestos
tools and equipment include: shovels, brooms, rags, air compressors, blowers, scrapers
contaminants include: grease, oil, adhesive spills
barriers include: ropes, delineators, plastic cones, caution tape

B-6.03 Verifies placement of roof penetrations, curbs and parapets

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.03.01P	confirm location and dimensions of roof penetrations, curbs and parapets	location and dimensions of roof penetrations, curbs and parapets are confirmed according to job specifications and through communication with trades responsible
B-6.03.02P	measure elevations of penetrations, curbs and parapets	elevations of penetrations, curbs and parapets are measured and verified to determine if adjustments are required according to design authority and manufacturers' specifications
B-6.03.03P	confirm secure installation of roof penetrations, curbs and parapets	secure installation of roof penetrations, curbs and parapets are confirmed according to visual inspection
B-6.03.04P	verify that materials used for penetrations, curbs and parapets are compatible with roofing system	materials used for penetrations, curbs and parapets compatible with roofing systems are verified according to design authority specifications

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.03.01L	demonstrate knowledge of procedures to verify placement of roof penetrations, curbs and parapets	describe procedure to verify placement of roof penetrations, curbs and parapets
		identify required penetrations and parapets
		identify elevation and fastening requirements
		describe clearances and placement of roof penetrations, curbs and parapets
		identify required ***components*** for penetrations
		describe importance of compatibility of materials used for penetrations, curbs and parapets with roofing system

RANGE OF VARIABLES

components include: utility lines, flashings, chimney flashings

B-6.04 Dries deck

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.04.01P	determine amount of deck to be dried	amount of deck to be dried is determined according to amount of roofing to be installed that day considering ***factors***
B-6.04.02P	determine ***method of drying***	***method of drying*** is determined according to composition of deck, type and amount of ***moisture*** present
B-6.04.03P	remove excess ***moisture***	excess ***moisture*** is removed using ***tools and equipment***
B-6.04.04P	remove remaining ***moisture***	remaining ***moisture*** is removed using ***methods of drying***
B-6.04.05P	confirm deck is dry	visual or tactile inspection is performed to confirm deck is dry to allow application of roofing
B-6.04.06P	temporarily cover dried deck	dried deck is covered with tarps temporarily to protect from further exposure to ***moisture***

RANGE OF VARIABLES

factors include: environmental conditions, labour, other trades
methods of drying include: vacuuming, dry mopping, torching, blowing
moisture includes: ice, snow, water

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.04.01L	demonstrate knowledge of procedures to dry roof deck	identify ***methods of drying***, and their ***hazards***
		describe effect of environmental conditions on drying time
		explain procedures and ***factors*** considered to determine how much roof deck to dry at one time
		explain procedure to determine when deck is dry enough to allow application of roofing

	explain importance of limiting deck exposure to ***moisture***
	explain procedure to install tarps

RANGE OF VARIABLES

methods of drying include: vacuuming, dry mopping, torching, blowing
factors include: environmental conditions, labour, other trades
moisture includes: ice, snow, water

MAJOR WORK ACTIVITY C
Installs low slope roofing

TASK C-7 Applies low slope roofing components

TASK DESCRIPTOR

Roofing components such as vapour barriers, cover boards, membranes, insulation and flashings work together to optimize the energy efficiency of buildings.

C-7.01 Installs support panels

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-7.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-7.01.02P	verify ***support panels*** layout, installation procedure and materials required	***support panels*** layout, installation procedure and materials required are verified according to manufacturers' specifications
C-7.01.03P	measure, cut, fit and place ***support panels***	***support panels*** are measured, cut, fitted and placed according to industry practices
C-7.01.04P	secure ***support panels*** to substrate	***support panels*** are secured to substrate according to manufacturers' specifications
C-7.01.05P	seal joints using ***materials*** as required	joints are sealed using ***materials*** to prevent leakage as required

RANGE OF VARIABLES

tools and equipment include: knives, drills/drivers, chalk lines, measuring tapes, saws, T-squares
support panels include: gypsum products, sheeting boards
materials include: tape, sheet metal flat stock

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.01.01L	demonstrate knowledge of ***support panels***, their characteristics and applications	define terminology associated with ***support panels***
		identify types of ***support panels*** and describe their characteristics and applications
C-7.01.02L	demonstrate knowledge of procedures to install ***support panels***	identify ***tools and equipment*** used to install ***support panels*** and describe their procedures for use
		describe procedures to install ***support panels***
		identify types of ***fastening methods*** used to secure ***support panels*** to substrate
		describe fastener pattern layout required
		identify types of ***materials*** used to seal joints
		identify types of ***installation methods***

RANGE OF VARIABLES

support panels include: gypsum products, sheeting boards
tools and equipment include: knives, drills/drivers, chalk lines, measuring tapes, saws, T-squares
fastening methods include: nails, screws, clips, plates, adhesives
materials include: tape, sheet metal flat stock
installation methods include: adhered, loose-laid, mechanically fastened

C-7.02 Primes substrate

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-7.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications
C-7.02.02P	protect ***surfaces*** from splatter and spills	***surfaces*** are protected from splatter and spills
C-7.02.03P	apply ***primer***	***primer*** is applied according to manufacturers' coverage rates

RANGE OF VARIABLES

tools and equipment include: spray applicators, rollers, brushes
surfaces include: interior and exterior finishes, surrounding environment
primers include: water-based, solvent-based

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.02.01L	demonstrate knowledge of ***primers***, their characteristics and applications	define terminology associated with ***primers***
		identify types of ***primers***, and describe their characteristics and applications
C-7.02.02L	demonstrate knowledge of procedures to apply ***primers*** to substrates	identify ***tools and equipment*** used to apply ***primers*** to substrates, and describe their procedures for use
		describe procedures to apply ***primers*** to substrates
		describe effects of environmental conditions on application of ***primer***

RANGE OF VARIABLES

primers include: water-based, solvent-based
tools and equipment include: spray applicators, rollers, brushes

C-7.03 Applies vapour retarder, vapour barrier and air barrier

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-7.03.01P	perform visual and sensory inspection	visual and sensory inspection is performed to ensure primer is dry
C-7.03.02P	verify material for application	material for application is verified to ensure installation meets manufacturers' specifications
C-7.03.03P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-7.03.04P	measure, cut, fit and place material	material is measured, cut, fitted and placed according to manufacturers' specifications

C-7.03.05P	protect roof deck and support panel from open flame and adhesive spills	roof deck and support panel are protected from open flame and adhesive spills by using protection tape
C-7.03.06P	overlap and seal side and end laps	side and end laps are overlapped and sealed according to manufacturers' specifications
C-7.03.07P	tie in vapour retarder, vapour barrier and air barrier to building envelope	vapour retarder, vapour barrier and air barrier are tied in to building envelope using ***methods*** to ensure continuity where possible

RANGE OF VARIABLES

tools and equipment include: knives, propane torches, adhesive applicators, weighted rollers, brooms, squeegees

methods include: thermally fused, fully adhered, self-adhered, adhesives, sealants, tapes, loose-laid

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.03.01L	demonstrate knowledge of ***vapour retarders, vapour barriers and air barriers***, their characteristics and applications	define terminology associated with ***vapour retarders, vapour barriers and air barriers***
		identify types of ***vapour retarders, vapour barriers and air barriers***, and describe their characteristics and applications
C-7.03.02L	demonstrate knowledge of procedures to install ***vapour retarders, vapour barriers and air barriers***	identify ***tools and equipment*** used to install ***vapour retarders, vapour barriers and air barriers***, and describe their procedures for use
		describe procedures to install ***vapour retarders, vapour barriers and air barriers***
		describe effects of environmental conditions on installation of ***vapour retarders, vapour barriers and air barriers***
		identify safe work practices when installing ***vapour retarders, vapour barriers and air barriers***
C-7.03.03L	demonstrate knowledge of regulatory requirements pertaining to installation of ***vapour retarders, vapour barriers and air barriers***	identify and interpret standards, codes and regulations pertaining to installation of ***vapour retarders, vapour barriers and air barriers***

RANGE OF VARIABLES

vapour retarders, vapour barriers and air barriers include: non-bituminous (polyethylene, rosin dry sheet, single-ply membranes), bituminous (kraft laminate, felt paper, modified)

tools and equipment include: knives, propane torches, adhesive applicators, weighted rollers, brooms, squeegees

C-7.04 Installs insulation

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-7.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-7.04.02P	establish and maintain layout pattern during installation	layout pattern is established and maintained during installation according to manufacturers' specifications, jurisdictional regulations, design authority specifications and industry practices
C-7.04.03P	measure, cut, fit and place material	material is measured, cut, fitted and placed to ensure a tight fit
C-7.04.04P	secure ***insulation***	***insulation*** is secured using fasteners or adhesives according to manufacturers' tested assemblies as per CSA or ballast as per manufacturers' specifications
C-7.04.05P	prevent damage to material integrity from asphalt burnouts, open flames, installation traffic and moisture	material integrity is maintained
C-7.04.06P	install multi-layers of ***insulation*** and sloped insulation	layout pattern is established and maintained during installation according to manufacturers' specifications, jurisdictional regulations, design authority specifications and industry practices

RANGE OF VARIABLES

tools and equipment include: hotwires, measuring tapes, chalk lines, saws, knives, mops, adhesive dispenser, screw guns

insulation includes: polystyrene (extruded and expanded), fibreglass, polyurethane, polyisocyanurate, mineral wool, composite board

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.04.01L	demonstrate knowledge of ***insulation***, its characteristics and applications	define terminology associated with ***insulation***
		identify types of ***insulation***, and describe their characteristics and applications
		describe ***heat transfer terms of insulation***
		describe sloped-insulation systems
		describe considerations when storing and protecting ***insulation*** from environmental conditions
C-7.04.02L	demonstrate knowledge of procedures to install ***insulation***	identify ***tools and equipment*** used to install ***insulation***, and describe their procedures for use
		describe procedures to install ***insulation***
		identify types of fasteners and adhesives used to install ***insulation***, and describe their characteristics and applications
		describe effects of environmental conditions on installation of ***insulation***
		identify safe work practices when installing ***insulation***
C-7.04.03L	demonstrate knowledge of regulatory requirements pertaining to ***insulation***	identify and interpret standards, codes and regulations pertaining to ***insulation***

RANGE OF VARIABLES

insulation includes: polystyrene (extruded and expanded), fibreglass, polyurethane, polyisocyanurate, mineral wool, composite board

heat transfer terms of insulation include: conduction, convection, radiation, R, RSI and K factors, vapour drive, thermal bridging, thermal bypass

tools and equipment include: hotwires, measuring tapes, chalk lines, saws, knives, mops, adhesive dispenser, screw guns

C-7.05 Installs cover board

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-7.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' written instructions
C-7.05.02P	verify ***cover board*** layout, installation procedures and materials required	***cover board*** layout, installation procedures and materials required are verified according to manufacturers' specifications
C-7.05.03P	establish and maintain layout pattern during installation	layout pattern is established and maintained during installation according to manufacturers' specifications, jurisdictional regulations, design authority specifications and industry practices
C-7.05.04P	measure, cut, fit and place ***cover board***	***cover board*** is measured, cut, fitted and placed according to manufacturers' specifications
C-7.05.05P	secure ***cover board*** to substrate	***cover board*** is secured to substrate according to manufacturers' specifications and design authority specifications
C-7.05.06P	protect underlying roof components from open flame and adhesive spills	underlying roof components are protected from open flame and adhesive spills by using protection tape

RANGE OF VARIABLES

tools and equipment include: knives, chalk lines, measuring tapes, saws, T-squares, mops, adhesive dispenser, screw guns, drills

cover boards include: wood fibre, asphaltic core, asphalt-impregnated, gypsum, cement, composite, polyisocyanurate

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-7.05.01L	demonstrate knowledge of ***cover boards***, their characteristics and applications	define terminology associated with ***cover boards***
		identify types of ***cover boards***, and describe their characteristics and applications
C-7.05.02L	demonstrate knowledge of procedures to install ***cover boards***	identify ***tools and equipment*** used to install ***cover boards***, and describe their procedures for use

	describe procedures to install ***cover boards***
	describe effects of environmental conditions on installation of ***cover boards***
	describe compatibility of materials when selecting ***cover boards***
	identify safe work practices when installing ***cover boards***

RANGE OF VARIABLES

cover boards include: wood fibre, asphaltic core, asphalt-impregnated, gypsum, cement, composite, polyisocyanurate

tools and equipment include: knives, chalk lines, measuring tapes, saws, T-squares, mops, adhesive dispenser, screw guns, drills

C-7.06 Installs drains, vents, curbs and penetrations

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-7.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-7.06.02P	select ***sealant***	***sealant*** is selected according to manufacturers' specifications
C-7.06.03P	determine location of ***drains***	location of ***drains*** is determined according to ***blueprints and drawings*** and their ***components***
C-7.06.04P	sump drain areas	drain areas are sumped to minimize ponding water
C-7.06.05P	cut and remove materials to place ***drains***, curbs or penetrations and ensure fit	materials are cut and removed to place ***drains***, curbs or penetrations and fit is ensured
C-7.06.06P	place penetration flashings and seals	penetration flashings and seals are placed according to manufacturers' specifications
C-7.06.07P	calculate elevations required for curbs considering material thickness	elevations required for curbs are calculated considering material thickness according to manufacturers' specifications
C-7.06.08P	insert and level curbs and penetrations	curbs and penetrations are inserted and leveled according to manufacturers' specifications

C-7.06.09P	insert ***drains***	***drains*** are inserted according to job specific requirements and manufacturers' specifications
C-7.06.10P	seal membranes to ***drains***, vents, curbs and penetrations	membranes are sealed to ***drains***, vents, curbs and penetrations according to manufacturers' specifications
C-7.06.11P	install mastic and clamping ring for ***drains*** if required	mastic and clamping ring for ***drains*** are installed if required according to manufacturers' specifications
C-7.06.12P	install drain baskets, screens and flow restrictors to ***drains***	drain baskets, screens and flow restrictors are installed according to manufacturers' specifications and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: knives, saws, scissors, wrenches, drills/drivers, caulking guns, compression seal screwdriver, pneumatic nailers, measuring tapes, tin/metal snips

sealants include: single-ply mastics, asphaltic mastics, membranes, silicone, polyurethane, liquid-applied membranes, one-part and two-part pourable sealers, lap sealants

drains include: mechanical, retrofit, scupper, overflow

blueprints and drawings include: digital, paper, shop drawings, as-built drawings

components of blueprints and drawings include: major (architectural, structural, electrical, mechanical), minor (cross-section, plans, elevations, details)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.06.01L	demonstrate knowledge of ***drains***, vents, curbs and penetrations, their characteristics and applications	define terminology associated with ***drains***, vents, curbs and penetrations
		identify types of ***drains***, vents, curbs and penetrations, and describe their characteristics and applications
C-7.06.02L	demonstrate knowledge of procedures to install ***drains***, vents, curbs and penetrations	identify ***tools and equipment*** used to install ***drains***, vents, curbs and penetrations, and describe their procedures for use
		describe procedures to install ***drains***, vents, curbs and penetrations
		identify types of ***sealants*** used to install ***drains***, vents, curbs and penetrations
		calculate elevations required for curbs
C-7.06.03L	demonstrate knowledge of regulatory requirements pertaining to ***drains***, vents, curbs and penetrations	identify and interpret standards, codes and regulations pertaining to ***drains***, vents, curbs and penetrations

RANGE OF VARIABLES

drains include: mechanical, retrofit, scupper, overflow

tools and equipment include: knives, saws, scissors, wrenches, drills/drivers, caulking guns, compression seal screwdriver, pneumatic nailers, measuring tapes, tin/metal snips

sealants include: single-ply mastics, asphaltic mastics, membranes, silicone, polyurethane, liquid-applied membranes, one-part and two-part pourable sealers, lap sealants

C-7.07 Applies ballast, walkways and protective surfaces

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-7.07.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-7.07.02P	inspect ballast and aggregate for proper size and cleanliness	ballast and aggregate are inspected for proper size and cleanliness according to roofing system specified
C-7.07.03P	cut, fit and place ***filter fabric*** and protective material or separation sheet where required	***filter fabric*** and protective material or separation sheet are cut, fitted and placed where required
C-7.07.04P	distribute ballast and aggregate material	ballast and aggregate material is spread to meet membrane manufacturers' specifications
C-7.07.05P	embed aggregate or granules evenly into cold or hot liquid process material	aggregate or granules are embedded evenly into cold or hot liquid process material according to manufacturers' specifications
C-7.07.06P	apply granulated cap sheets and surface coatings	granulated cap sheets and surface coatings are applied according to manufacturers' specifications
C-7.07.07P	cut, lay out and place patio stones and cement-top insulation	patio stones and cement-top insulation are cut, laid out and placed according to ***blueprints and drawings*** and their ***components***, and manufacturers' specifications
C-7.07.08P	maintain level elevation of patio stones during installation	level elevation of patio stones is maintained during installation by use of pedestals and shims according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: motorized equipment, shovels, wheelbarrows, dollies, torches, hot air welding equipment, probes, rakes, hoist and cranes, conveyor belts, spreaders, sprayers, saws

filter fabrics include: needle punch, non-woven, woven non-filament

blueprints and drawings include: digital, paper, shop drawings, as-built drawings

components of blueprints and drawings include: major (architectural, structural, electrical, mechanical), minor (cross-section, plans, elevations, details)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.07.01L	demonstrate knowledge of ballast, walkways and protective surfaces, their characteristics and applications	define terminology associated with ballast, walkways and protective surfaces
		identify ***types of ballast***, ***walkways*** and protective surfaces, and describe their characteristics and applications
C-7.07.02L	demonstrate knowledge of procedures to install ballast, walkways and protective surfaces	identify ***tools and equipment*** used to install ballast, walkways and protective surfaces, and describe their procedures for use
		describe procedures to install ballast, walkways and protective surfaces

RANGE OF VARIABLES

types of ballast include: aggregate, pavers, cement-top insulation, overburden

types of walkways include: concrete pavers, membrane, metal, rubber, wood

tools and equipment include: motorized equipment, shovels, wheelbarrows, dollies, torches, hot air welding equipment, probes, rakes, hoist and cranes, conveyor belts, spreaders, sprayers, saws

C-7.08 Installs metal flashings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-7.08.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-7.08.02P	determine locations, profile and size of metal flashings to be installed	locations, profile and size of metal flashings to be installed are determined by measuring roof parapets, penetrations and roof junctions
C-7.08.03P	measure and cut metal flashings	metal flashings are measured and cut according to task

C-7.08.04P	fit metal flashings together with ***seams***	metal flashings are fit together with ***seams***
C-7.08.05P	select gauge and colour of flashing	gauge and colour of flashing is selected according to job specifications and jurisdictional regulations
C-7.08.06P	secure metal flashings using ***fasteners***	metal flashings are secured using ***fasteners***
C-7.08.07P	apply sealant to metal flashings	metal flashings are sealed with compatible sealant according to task and manufacturers' specifications
C-7.08.08P	seal membrane to metal flashings	membrane is sealed to metal flashings according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: tin/metal snips, measuring tapes, protractors, caulking guns, power shears, screw guns, drills/drivers, metal benders, combination squares, carpenters' squares, torches, rollers, brushes, hot air welding equipment, hammers

seams include: standing seam, S-locks, lap joints, butt joints

fasteners include: screws, nails, retaining clips

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-7.08.01L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications
		identify ***metal flashing materials*** and their compatibility
		describe watershed design principles of metal flashings
		explain expansion and contraction of metal flashings
C-7.08.02L	demonstrate knowledge of procedures to install metal flashings	identify ***tools and equipment*** used to install metal flashings, and describe their procedures for use
		describe procedures to install metal flashings
		identify types of ***fasteners*** used to secure metal flashings
C-7.08.03L	demonstrate knowledge of regulatory requirements pertaining to metal flashings	identify and interpret standards, codes and regulations pertaining to metal flashings

RANGE OF VARIABLES

types of metal flashings include: wall, base, parapet, cap, termination, reglet, drip edge, aggregate stop, thru-wall, saddle

metal flashing materials include: aluminum, copper, steel, galvanized, lead, stainless steel, zinc, polyvinyl chloride (PVC)/thermoplastic polyolefin (TPO) coated

tools and equipment include: tin/metal snips, measuring tapes, protractors, caulking guns, power shears, screw guns, drills/drivers, metal benders, combination squares, carpenters' squares, torches, rollers, brushes, hot air welding equipment, hammers

fasteners include: screws, nails, retaining clips

TASK C-8 Applies low slope roofing membranes

TASK DESCRIPTOR

Applying membranes is an essential part of the roofing trade because this prevents water from entering a building and prevents damage to building components.

C-8.01 Relaxes membranes

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-8.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.01.02P	remove labelling and wrappers from rolls	labelling and wrappers from rolls are removed
C-8.01.03P	unroll membrane	membrane is unrolled within proximity of installation
C-8.01.04P	heat membrane	membrane is heated according to manufacturers' specifications and environmental conditions
C-8.01.05P	position weights	weights are positioned to weigh down membrane
C-8.01.06P	visually inspect membrane	membrane is visually inspected to ensure it lies flat and straight

RANGE OF VARIABLES

tools and equipment include: knives, torches, weights

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.01.01L	demonstrate knowledge of procedures and ***techniques*** to relax membranes	identify ***tools and equipment*** used to relax membranes, and describe their procedures for use
		describe ***techniques*** to relax membranes
		identify types of membranes that require relaxing

RANGE OF VARIABLES

tools and equipment include: knives, torches, weights

techniques include: storing material at roof temperature until usage, lying in place, stacking unrolled sections

C-8.02 Sets membranes

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-8.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications
C-8.02.02P	establish direction of laps to shed water	membrane rolls are installed to shed water according to manufacturers' specifications
C-8.02.03P	measure and cut membrane	membrane is measured and cut according to task
C-8.02.04P	position and overlap membrane sheets and rolls	membrane sheets and rolls are positioned and overlapped according to type of membrane, type of deck or direction of slope
C-8.02.05P	visually verify membrane layout and alignment	membrane layout and alignment is installed according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: knives, measuring tapes, T-squares, scissors, marking tools

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.02.01L	demonstrate knowledge of procedures to set membranes	identify ***tools and equipment*** used to set membranes, and describe their procedures for use
		describe procedures to set membranes
		describe effects of ***environmental conditions*** when setting membranes

RANGE OF VARIABLES

tools and equipment include: knives, measuring tapes, T-squares, scissors, marking tools
environmental conditions include: temperature, wind, moisture

C-8.03 Applies membranes using hot-liquid process

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-8.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.03.02P	monitor temperature of roofing asphalts with a thermometer	temperature of roofing asphalts is monitored with a thermometer to maintain integrity and viscosity
C-8.03.03P	mop or pour roofing asphalts	roofing asphalts are mopped or poured according to manufacturers' specifications
C-8.03.04P	roll membrane into roofing asphalts	membrane is rolled into roofing asphalts
C-8.03.05P	broom membrane in place to enhance adhesion	membrane is broomed in place to enhance adhesion
C-8.03.06P	monitor volume of rubberized asphalt with gauge	volume of rubberized asphalt is monitored with gauge to maintain thickness

RANGE OF VARIABLES

tools and equipment include: kettles, burners, torches, hot tankers/carriers, melters, asphalt mop pails, mini moppers, cotton/fibreglass mop heads, brooms, thermal scanning equipment/thermometer, knives, dippers, skimmers, fire extinguishers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.03.01L	demonstrate knowledge of hot process-applied membranes, their characteristics and applications	define terminology associated with membranes
		identify ***types of hot process-applied membranes***, and describe their characteristics and applications
C-8.03.02L	demonstrate knowledge of roofing asphalts used to apply membranes	identify ***types of roofing asphalts*** used to apply membranes
		describe softening point of asphalts
		describe flashpoint of asphalts
		describe EVT of asphalts
		describe safe work practices pertaining to use of asphalts
C-8.03.03L	demonstrate knowledge of procedures to apply membranes using hot-liquid process	identify ***tools and equipment*** used to apply membranes using hot-liquid process, and describe their procedures for use
		describe procedures to apply membranes using hot-liquid process
		describe effects of ***environmental conditions*** when applying membranes
		describe importance of continuous adhesion
		identify roofing systems requiring membranes using hot-liquid process
		describe safe work practices pertaining to use of hot-liquid processes to apply membranes
		describe policies on fire watch procedures
C-8.03.03L	demonstrate knowledge of regulatory requirements pertaining to installation of membranes	identify standards, codes and regulations pertaining to installation of membranes

RANGE OF VARIABLES

types of hot process-applied membranes include: built-up roofing (BUR), single-ply, styrene-butadiene styrene (SBS)

types of roofing asphalts include: 1, 2, 3, rubberized asphalt, styrene-ethylene-butylene styrene (SEBS)

tools and equipment include: kettles, burners, torches, hot tankers/carriers, melters, asphalt mop pails, mini moppers, cotton/fibreglass mop heads, brooms, thermal scanning equipment/thermometer, knives, dippers, skimmers, fire extinguishers

environmental conditions include: temperature, wind, moisture

C-8.04 Applies membranes using torched-on method

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.04.02P	torch-weld rolls in place	rolls are torch-welded in place
C-8.04.03P	monitor propane pressure and adjust torch flame	propane pressure is monitored by a regulator and torch flame is adjusted to ensure temperature of flame
C-8.04.04P	apply pressure to laps or seams to ensure lap or seam integrity	laps or seams are sealed as per manufacturers' specifications
C-8.04.05P	maintain continuity of bitumen bleed-out as roll is torch-welded into place	continuity of bitumen bleed-out is maintained as roll is torch-welded into place
C-8.04.06P	embed granules at end laps and transitions before applying overlapping sheet	granules are embedded at end laps before applying overlapping sheet
C-8.04.07P	installs granules into areas where bitumen is exposed and granule loss is observed	granules are installed in bitumen according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: torches, knives, roll pullers, trowels, granular embedder/degranulators, propane tanks, dollies, T-squares, chalk lines, fire extinguishers, temperature scanners, hand roller, sponges

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-8.04.01L	demonstrate knowledge of membranes using torched-on method, their characteristics and applications	define terminology associated with membranes
		identify ***types of torched-on membranes*** using torched-on method and describe their characteristics and applications
C-8.04.02L	demonstrate knowledge of procedures to apply membranes using torched-on method	identify ***tools and equipment*** used to apply membranes using torched-on method, and describe their procedures for use
		describe procedures to apply membranes using torched-on method

		describe effects of ***environmental conditions*** when applying membranes
		describe importance of continuous adhesion
		describe amount of offset of multi-layer membrane installations
		identify roofing systems requiring membranes using torched-on method
		describe safe work practices pertaining to use of torches
		describe policies on fire watch procedures
C-8.04.03L	demonstrate knowledge of regulatory requirements pertaining to installation of membranes using torched-on method	identify standards, codes and regulations pertaining to installation of membranes using torched-on method

RANGE OF VARIABLES

types of torched-on membranes include: SBS, atactic polypropylene polymers (APP)

tools and equipment include: torches, knives, roll pullers, trowels, granular embedder/degranulators, propane tanks, dollies, T-squares, chalk lines, fire extinguishers, temperature scanners, hand roller, sponges

environmental conditions include: temperature, wind, moisture

C-8.05 Applies membranes using hot air welding

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.05.02P	ensure overlapping membrane is clean and free of debris	overlapping membrane is clean and free of debris
C-8.05.03P	perform field test with sample membrane	field test with sample membrane is performed to confirm hot air welding equipment setting and that welds are sufficient for ***environmental conditions***
C-8.05.04P	hot air weld side and end laps	side and end laps are hot air welded using automatic and hand-held hot air welding machine

C-8.05.05P	perform pre-welds and welds	pre-welds and welds are performed moving from inside to outside of material using rollers and hand-held hot air welding equipment
C-8.05.06P	probe seams for continuity and repair defects	seams are probed for continuity and defects are repaired
C-8.05.07P	apply membrane sealants to cut edges	membrane sealants are applied to cut edges according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: hand and automatic hot air welding equipment, probes, hand rollers, hand scrubbers, scissors, generators, power cords, ground fault circuit interrupters (GFCIs)

environmental conditions include: temperature, wind, moisture

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.05.01L	demonstrate knowledge of membranes that require hot air welding, their characteristics and applications	define terminology associated with membranes
		identify ***types of membranes that require hot air welding***, and describe their characteristics and applications
C-8.05.02L	demonstrate knowledge of procedures to apply membranes using hot air welding	identify ***tools and equipment*** used to apply membranes, and describe their procedures for use
		describe procedures to apply membranes using hot air welding
		describe effects of ***environmental conditions*** when applying membranes
		describe importance of continuous adhesion
		identify roofing systems requiring membranes using hot air welding
		describe safe work practices pertaining to use of hot air welding equipment
		describe policies on fire watch procedures
C-8.05.03L	demonstrate knowledge of regulatory requirements pertaining to the installation of membranes	identify standards, codes and regulations pertaining to the installation of membranes

RANGE OF VARIABLES

types of membranes that require hot air welding include: PVC, TPO, SBS, ketone ethylene ester (KEE), chlorosulfonated polyethylene

tools and equipment include: hand and automatic hot air welding equipment, probes, hand rollers, hand scrubbers, scissors, generators, power cords, ground fault circuit interrupters (GFCIs)

environmental conditions include: temperature, wind, moisture

C-8.06 Applies membranes using cold applied methods

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-8.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.06.02P	apply primers and adhesives	primers and adhesives are applied according to manufacturers' specifications
C-8.06.03P	install ***cold applied membranes***	***cold applied membranes*** are applied according to manufacturers' specifications
C-8.06.04P	broom membranes into ***cold applied adhesives*** and roll with weighted roller	membranes are broomed into ***cold applied adhesives*** and rolled with a weighted roller to enhance adhesion

RANGE OF VARIABLES

tools and equipment include: cold adhesive applicators, brooms, rollers, brushes, trowels, knives, scissors, squeegees

cold applied membranes include: asphalt coated rolls, modified bituminous rolls, single-ply membranes, self-adhered membranes

cold applied adhesives include: primers, asphalt cut-backs, emulsions, two-part adhesives, solvent adhesives, water-based adhesives

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.06.01L	demonstrate knowledge of ***cold applied adhesives***, their characteristics and applications	define terminology associated with ***cold applied adhesives***
		identify types of ***cold applied adhesives***, and describe their characteristics and applications
C-8.06.02P	demonstrate knowledge of ***cold applied membranes***, their characteristics and applications	define terminology associated with ***cold applied membranes***

		identify types of ***cold applied membranes***, and describe their characteristics and applications
C-8.06.03L	demonstrate knowledge of procedures to install ***cold applied membranes***	identify ***tools and equipment*** used to install ***cold applied membranes***, and describe their procedures for use
		describe procedures to install ***cold applied membranes*** using cold applied method
		describe effects of ***environmental conditions*** when installing ***cold applied membranes***
		identify roofing systems requiring ***cold applied membranes***
C-8.06.04L	demonstrate knowledge of regulatory requirements pertaining to installation of ***cold applied membranes***	identify standards, codes and regulations pertaining to installation of ***cold applied membranes***

RANGE OF VARIABLES

cold applied adhesives include: primers, asphalt cut-backs, emulsions, two-part adhesives, solvent adhesives, water-based adhesives

cold applied membranes include: asphalt coated rolls, modified bituminous rolls, single-ply membranes, self-adhered membranes

tools and equipment include: cold adhesive applicators, brooms, rollers, brushes, trowels, knives, scissors, squeegees

environmental conditions include: temperature, wind, moisture

C-8.07 Applies membranes using mechanical fasteners

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.07.01P	locate ***utilities*** below and at deck level	***utilities*** are located to avoid potential damage
C-8.07.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.07.03P	determine length/gauge and ***type of mechanical fastener*** to use	length/gauge and ***type of mechanical fastener*** to use is determined according to manufacturers' specifications

C-8.07.04P	fasten membrane to meet wind uplift requirements	membranes are secured using fasteners according to manufacturers' tested assemblies according to CSA
C-8.07.05P	ensure adequate tension of fasteners	adequate tension of fasteners is ensured to prevent overdriving or underdriving

RANGE OF VARIABLES

utilities include: water lines, electrical equipment, drainage systems
tools and equipment include: drills, screw guns, induction welders
types of mechanical fasteners include: screws, plates, bars

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.07.01L	demonstrate knowledge of mechanical fasteners, their characteristics and applications	define terminology associated with mechanical fasteners
		identify ***types of mechanical fasteners***, and describe their characteristics and applications
C-8.07.02L	demonstrate knowledge of procedures to apply membranes using mechanical fasteners	identify ***tools and equipment*** used to apply membranes with mechanical fasteners, and describe their procedures for use
		describe procedures to apply membranes using mechanical fasteners
		describe effects of ***environmental conditions*** when applying membranes
		identify roofing systems requiring mechanical fastening or induction securement
C-8.07.03L	demonstrate knowledge of regulatory requirements pertaining to installation of membranes	identify standards, codes and regulations pertaining to installation of membranes

RANGE OF VARIABLES

types of mechanical fasteners include: screws, plates, bars
tools and equipment include: drills, screw guns, induction welders
environmental conditions include: temperature, wind, moisture

C-8.08 Applies loose-laid membranes

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.08.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
C-8.08.02P	install perimeter and penetrations securement strip	perimeter and penetrations of roof are mechanically secured according to manufacturers' specifications
C-8.08.03P	prepare side and end laps	side and end laps are prepared by removing contaminants with scrubbers and cleaners as per manufacturers' specifications
C-8.08.04P	seal side and end laps	side and end laps are sealed with tapes or hot air welded according to manufacturers' specifications
C-8.08.05P	roll seams with hand roller	seams are rolled with hand roller
C-8.08.06P	apply sealant where required	sealant is applied where required

RANGE OF VARIABLES

tools and equipment include: rollers, brushes, scrubbers, scissors, knives, aggregate spreaders, aggregate hoppers, hot air welding equipment, shovels, wheelbarrows, conveyors, hoist, cranes, drills/drivers, fasteners

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-8.08.01L	demonstrate knowledge of ***loose-laid membranes***, their characteristics and applications	define terminology associated with ***loose-laid membranes***
		identify types of ***loose-laid membranes*** and describe their characteristics and applications
C-8.08.02L	demonstrate knowledge of procedures to apply ***loose-laid membranes***	identify ***tools and equipment*** used to apply ***loose-laid membranes***, and describe their procedures for use
		describe procedures to apply ***loose-laid membranes***
		describe effects of ***environmental conditions*** when applying ***loose-laid membranes***

		identify roofing systems requiring ***loose-laid membranes***
C-8.08.03L	demonstrate knowledge of regulatory requirements pertaining to installation of ***loose-laid membranes***	identify standards, codes and regulations pertaining to installation of ***loose-laid membranes***

RANGE OF VARIABLES

loose-laid membranes include: ethylene propylene diene monomer (EPDM), TPO, PVC

tools and equipment include: rollers, brushes, scrubbers, scissors, knives, aggregate spreaders, aggregate hoppers, hot air welding equipment, shovels, wheelbarrows, conveyors, hoist, cranes, drills/drivers, fasteners

environmental conditions include: temperature, wind, moisture

C-8.09 Applies liquid-applied membranes

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.09.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.09.02P	prepares roof and substrate deck	roof and substrate deck are prepared according to manufacturers' specifications
C-8.09.03P	prepare liquid-applied membrane	liquid-applied membrane is prepared according to manufacturers' specifications and ***environmental conditions***
C-8.09.04P	apply liquid-applied membrane and reinforcement	liquid-applied membrane and reinforcement are applied according to manufacturers' specifications
C-8.09.05P	use gauge to ensure uniformity of thickness of liquid-applied membrane	gauge is used to ensure thickness of liquid-applied membrane is uniform

RANGE OF VARIABLES

tools and equipment include: drills, mixers, pails, scissors, rollers, squeegees, brushes, sprayers

environmental conditions include: temperature, wind, moisture

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.09.01L	demonstrate knowledge of ***liquid-applied membranes***, their characteristics and applications	define terminology associated with ***liquid-applied membranes***
		identify types of ***liquid-applied membranes***, and describe their characteristics and applications
C-8.09.02L	demonstrate knowledge of procedures to apply ***liquid-applied membranes***	identify ***tools and equipment*** used to apply ***liquid-applied membranes***, and describe their procedures for use
		describe procedures to apply ***liquid-applied membranes***
		describe effects of ***environmental conditions*** when mixing and applying ***liquid-applied membranes***
		identify roofing systems requiring ***liquid-applied membranes***
C-8.09.03L	demonstrate knowledge of regulatory requirements pertaining to the installation of ***liquid-applied membranes***	identify standards, codes and regulations pertaining to the installation of ***liquid-applied membranes***

RANGE OF VARIABLES

liquid-applied membranes include: polymethyl-methacrylate (PMMA), epoxies, polyurethane
tools and equipment include: drills, mixers, pails, scissors, rollers, squeegees, brushes, sprayers
environmental conditions include: temperature, wind, moisture

C-8.10 Installs membrane flashings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-8.10.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.10.02P	measure and cut membrane flashing	membrane flashing is measured and cut according to task and manufacturers' specifications
C-8.10.03P	shape membrane flashing to form to parapets, penetrations, and roof to wall transitions	membrane flashing is shaped by bending or heating to form to parapets, penetrations, and roof to wall transitions

C-8.10.04P	install ***materials*** to accept membrane flashing on substrate	***materials*** are installed to accept membrane flashing on substrate
C-8.10.05P	install successive layers	successive layers are installed according to ***type of membrane***

RANGE OF VARIABLES

tools and equipment include: rollers, brushes, trowels, scrubbers, scissors, mop carts, kettles, torches, knives, hot air welding equipment

materials include: primers, adhesives, liquids

types of membranes include: two-ply SBS, built-up roofing, single-ply, liquid-applied

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-8.10.01L	demonstrate knowledge of membrane flashings, their characteristics and applications	define terminology associated with membrane flashings
		identify ***types of membrane flashings***, and describe their characteristics and applications
C-8.10.02L	demonstrate knowledge of procedures to install membrane flashings	identify ***tools and equipment*** used to install membrane flashings, and describe their procedures for use
		describe procedures to install membrane flashings
		identify ***locations requiring flashings***
		describe effects of ***environmental conditions*** when installing membrane flashings
C-8.10.03L	demonstrate knowledge of regulatory requirements pertaining to installation of membrane flashings	identify standards, codes and regulations pertaining to installation of membrane flashings

RANGE OF VARIABLES

types of membrane flashings include: self-adhesive, modified bitumen, felt, rubber, pressure sensitive, liquid-applied

tools and equipment include: rollers, brushes, trowels, scrubbers, scissors, mop carts, kettles, torches, knives, hot air welding equipment

locations requiring flashing include: curbs, parapets, roof upstands

environmental conditions include: temperature, wind, moisture

C-8.11 Installs temporary seals and temporary drains

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-8.11.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task and manufacturers' specifications
C-8.11.02P	determine temporary seal membrane compatibility with existing roof and new roofing materials	compatibility of existing roof and new roofing materials with temporary seal membrane is determined
C-8.11.03P	prepare existing roof surfaces	existing roof surfaces are prepared using ***procedures*** to accept temporary seal membrane
C-8.11.04P	apply temporary seal	temporary seal is applied using ***techniques*** to prevent moisture infiltration
C-8.11.05P	determine onsite requirements and install ***temporary roof drainage***	onsite requirements are determined and ***temporary roof drainage*** is installed
C-8.11.06P	verify integrity of temporary seals and temporary drains by visual and sensory inspection	integrity of temporary seals and temporary drains is verified by visual and sensory inspection

RANGE OF VARIABLES

tools and equipment include: spud bars, mops, brooms, trowels, torches, scrubbers, dippers, caulking guns

procedures include: spudding, granular embedding, washing with soap and water or solvent, priming

techniques include: elevating, applying ballast, lapping, torch-applied, self-adhering, mastic

temporary roof drainage includes: retrofit drain, emergency scupper, roof pumps

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-8.11.01L	demonstrate knowledge of temporary seals and temporary drains, their characteristics and applications	define terminology associated with temporary seals and temporary drains
		identify temporary seals and temporary drains, and describe their characteristics and applications
C-8.11.02L	demonstrate knowledge of procedures to install temporary seals and temporary drains	identify ***tools and equipment*** used to install temporary seals and temporary drains, and describe their procedures for use
		describe procedures used to install temporary seals and temporary drains

	explain where and when temporary seals and temporary drains are required
	identify ***types of materials*** for temporary seals
	explain material compatibilities

RANGE OF VARIABLES

tools and equipment include: spud bars, mops, brooms, trowels, torches, scrubbers, dippers, caulking guns

types of materials include: asphalt, sealants, membranes

MAJOR WORK ACTIVITY D
Installs steep slope roofing

TASK D-9 Performs common steep slope practices

TASK DESCRIPTOR

Roofers need to understand the basic principles and jurisdictional requirements of water shedding roofing systems.

D-9.01 Installs steep slope underlayment

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-9.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task, manufacturers' specifications and jurisdictional regulations
D-9.01.02P	relax eave protection	eave protection is relaxed by unrolling to ensure it is straight and flat before installation
D-9.01.03P	apply eave protection	eave protection is applied according to roof slope and jurisdictional regulations and requirements
D-9.01.04P	measure, cut, and fit underlayment	underlayment is measured, cut and fitted according to roof size and obstructions
D-9.01.05P	overlap underlayment	underlayment is overlapped according to manufacturers' specifications and roof slope

RANGE OF VARIABLES

tools and equipment include: hammers, staplers, hatchets, knives, roof jacks, ladder jacks

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-9.01.01L	demonstrate knowledge of steep slope underlayment, their characteristics, applications and termination heights	define terminology associated with steep slope underlayment
		identify ***types of steep slope underlayment***, and describe their characteristics, applications and termination heights
		describe ***reasons for installing underlayment***
D-9.01.02L	demonstrate knowledge of procedures to install steep slope underlayment	identify ***tools and equipment*** used to install steep slope underlayment, and describe their procedures for use
		describe procedures to install steep slope underlayment
D-9.01.03L	demonstrate knowledge of regulatory requirements pertaining to installation of steep slope underlayment	identify and interpret standards, codes and regulations pertaining to installation of steep slope underlayment
		identify minimum overlap of underlayment

RANGE OF VARIABLES

types of steep slope underlayment include: felt, mineral surfaced, self-adhered, modified bitumen, synthetics

reasons for installing underlayment include: secondary barrier, temporary protection while roofing

tools and equipment include: hammers, staplers, hatchets, knives, roof jacks, ladder jacks

D-9.02 Installs steep slope venting

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-9.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-9.02.02P	calculate and verify venting requirements	venting requirements are calculated and verified according to NBC and jurisdictional regulations
D-9.02.03P	cut deck for continuous venting	deck is cut for continuous venting according to roof design

D-9.02.04P	cut deck for static air vents	deck is cut for static air vents according to roof design
D-9.02.05P	fasten roof vents	roof vents are fastened to prevent displacement according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: hammers, hatchets, knives, saws, pneumatic nailers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-9.02.01L	demonstrate knowledge of steep slope venting, their characteristics and applications	define terminology associated with steep slope venting
		identify ***types of steep slope venting***, and describe their characteristics and applications
		describe ***reasons for venting spaces and requirements***
D-9.02.02L	demonstrate knowledge of procedures to install steep slope venting	identify ***tools and equipment*** used to install steep slope venting, and describe their procedures for use
		describe procedures to install steep slope venting
D-9.02.03L	demonstrate knowledge of regulatory requirements pertaining to installation of steep slope venting	identify and interpret standards, codes and regulations pertaining to installation of steep slope venting

RANGE OF VARIABLES

types of steep slope venting include: passive, mechanical

reasons for venting spaces and requirements include: longevity of roofing system, prevention of mildew, condensation, rot, ice damming

tools and equipment include: hammers, hatchets, knives, saws, pneumatic nailers

D-9.03 Installs steep slope valley applications

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-9.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-9.03.02P	determine valley type and style	valley type and style are determined
D-9.03.03P	install ***valley protection*** and flashing	***valley protection*** and flashing are installed according to jurisdictional regulations and manufacturers' specifications
D-9.03.04P	position shingles, tiles and metal roofing	shingles, tiles and metal roofing are positioned according to valley type and manufacturers' specifications
D-9.03.05P	mitre cut and fit shingles, tiles and metal roofing	shingles, tiles and metal roofing are mitre cut and fitted according to slope of roof, valley type and manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: tin/metal snips, metal shears, hammers, knives, caulking guns, folding pliers

valley protection includes: self-adhered, felt, synthetics, metal

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-9.03.01L	demonstrate knowledge of valley applications, their characteristics and styles	define terminology associated with valley applications
		identify ***types of valley applications***, and describe their characteristics and styles
D-9.03.02L	demonstrate knowledge of procedures to install valley applications	identify ***tools and equipment*** used to install valley applications, and describe their procedures for use
		describe procedures to install valley applications
D-9.03.03L	demonstrate knowledge of regulatory requirements pertaining to valley applications	identify and interpret standards, codes and regulations pertaining to valley applications

RANGE OF VARIABLES

types of valley applications include: woven, closed cut, open

tools and equipment include: tin/metal snips, metal shears, hammers, knives, caulking guns, folding pliers

D-9.04 Installs steep slope saddles/crickets

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-9.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-9.04.02P	determine saddle/cricket requirements	saddle/cricket requirements are determined according to jurisdictional regulations
D-9.04.03P	determine materials	materials are determined according to deck type and job specifications
D-9.04.04P	build saddles/crickets	saddles/crickets are built by cutting and installing materials

RANGE OF VARIABLES

tools and equipment include: saws, measuring tapes, levels, hammers

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-9.04.01L	demonstrate knowledge of saddles/crickets, their characteristics and applications	define terminology associated with saddles/crickets
		identify saddles/crickets, and describe their characteristics and applications
D-9.04.02L	demonstrate knowledge of procedures to build and install saddles/crickets	identify ***tools and equipment*** used to build and install saddles/crickets, and describe their procedures for use
		describe procedures to build and install saddles/crickets
		identify basic skills required to build saddles/crickets
		identify material types and compatibility

		identify types of decks and requirements
D-9.04.03L	demonstrate knowledge of regulatory requirements pertaining to saddles/crickets	identify and interpret standards, codes and regulations pertaining to saddles/crickets

RANGE OF VARIABLES

tools and equipment include: saws, measuring tapes, levels, hammers

D-9.05 Installs steep slope penetration flashings

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-9.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-9.05.02P	verify penetration flashing requirements	penetration flashing requirements are verified according to penetrations
D-9.05.03P	cut deck for penetration flashing installation	deck is cut for penetration flashing installation according to task
D-9.05.04P	perform penetration flashings installation	penetration flashings are installed according to roofing system
D-9.05.05P	apply sealant as required	sealant is applied as required

RANGE OF VARIABLES

tools and equipment include: screwdrivers, drills, caulking guns, hammers, hatchets, knives, saws

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-9.05.01L	demonstrate knowledge of steep slope penetration flashings, their characteristics and applications	define terminology associated with steep slope penetration flashings
		identify ***types of steep slope penetration flashings***, and describe their characteristics and applications
D-9.05.02L	demonstrate knowledge of procedures to install steep slope penetration flashings	identify ***tools and equipment*** used to install steep slope penetration flashings, and describe their procedures for use

		describe procedures to install steep slope penetration flashings
D-9.05.03L	demonstrate knowledge of regulatory requirements pertaining to steep slope penetration flashings	identify and interpret standards, codes and regulations pertaining to steep slope penetration flashings

RANGE OF VARIABLES

types of steep slope penetration flashings include: plumbing vents, electrical stack, fan vents, B-vents
tools and equipment include: screwdrivers, drills, caulking guns, hammers, hatchets, knives, saws

TASK D-10 Applies shingles

TASK DESCRIPTOR

Shingles are in high demand in residential and commercial projects. Shingles are commonly used for steep slope roofing.

D-10.01 Determines layout of shingles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-10.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-10.01.02P	establish alignment of shingles	alignment of shingles is established by using ***tools and equipment***
D-10.01.03P	establish layout sequence	layout sequence is established according to roof style, ***type of shingle*** and manufacturers' specifications
D-10.01.04P	match course alignment at adjacent slopes	course alignment at adjacent slopes are matched to ensure alignment of shingles

RANGE OF VARIABLES

tools and equipment include: measuring tapes, chalk lines
types of shingles include: asphalt (three tab, architectural), wood (shakes, shingles), metal (aluminum, steel, copper), rubber, composite

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-10.01.01L	demonstrate knowledge of shingles, their characteristics and applications	define terminology associated with shingles
		identify ***types of shingles***, and describe their characteristics and applications
D-10.01.02L	demonstrate knowledge of procedures to determine layout of shingles	identify ***tools and equipment*** used to determine layout of shingles, and describe their procedures for use
		describe procedures to determine layout of shingles

RANGE OF VARIABLES

types of shingles include: asphalt (three tab, architectural), wood (shakes, shingles), metal (aluminum, steel, copper), rubber, composite

tools and equipment include: measuring tapes, chalk lines

D-10.02 Installs starter strip and starter course

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-10.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-10.02.02P	determine offset alignment of shingle starter course	offset alignment of shingle starter course is determined to ensure watershedding
D-10.02.03P	verify overhang	overhang is verified to ensure water runoff according to jurisdictional regulations
D-10.02.04P	fasten starter strips or starter course	starter strips or starter course are fastened using fasteners according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: hammers, hatchets, knives, saws, staplers, pneumatic nailers, fasteners

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-10.02.01L	demonstrate knowledge of starter strips and starter courses, their characteristics and applications	define terminology associated with starter strips and starter courses
		identify types of starter strips and starter courses, and describe their characteristics and applications
D-10.02.02L	demonstrate knowledge of procedures to install starter strips and starter courses	identify ***tools and equipment*** used to install starter strips and starter courses, and describe their procedures for use
		identify types and lengths of fasteners used to fasten starter strips and starter courses
		describe procedures to install starter strips and starter courses
		describe exposure, offset and overlap allowances
D-10.02.03L	demonstrate knowledge of regulatory requirements pertaining to starter strips and starter courses	identify and interpret standards, codes and regulations pertaining to starter strips and starter courses

RANGE OF VARIABLES

tools and equipment include: hammers, hatchets, knives, saws, staplers, pneumatic nailers, fasteners

D-10.03 Fastens shingles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-10.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-10.03.02P	determine fastener location	fastener location is determined according to manufacturers' specifications
D-10.03.03P	select and use types and lengths of fasteners	types and lengths of fasteners are selected and used according to ***type of shingle*** and manufacturers' specifications

D-10.03.04P	maintain shingle pattern	shingle pattern is maintained to ensure alignment of shingles and visual aesthetics, and according to manufacturers' specifications
D-10.03.05P	fasten hip and ridge caps	hip and ridge caps are fastened

RANGE OF VARIABLES

tools and equipment include: hammers, pneumatic nailers, chalk lines, hatchets, knives, fasteners

types of shingles include: asphalt (three tab, architectural), wood (shakes, shingles), metal (aluminum, steel, copper), rubber, composite

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-10.03.01L	demonstrate knowledge of shingles, their characteristics and applications	define terminology associated with shingles
		identify ***types of shingles***, and describe their characteristics and applications
D-10.03.02L	demonstrate knowledge of procedures to fasten shingles	identify ***tools and equipment*** used to fasten shingles, and describe their procedures for use
		identify types and lengths of fasteners used to fasten shingles
		describe procedures to fasten shingles
		describe wind proofing methods

RANGE OF VARIABLES

types of shingles include: asphalt (three tab, architectural), wood (shakes, shingles), metal (aluminum, steel, copper), rubber, composite

tools and equipment include: hammers, pneumatic nailers, chalk lines, hatchets, knives, fasteners

D-10.04 Cuts shingles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-10.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-10.04.02P	perform cuts to fit around ***roof penetrations***	cuts are performed to fit around ***roof penetrations***

D-10.04.03P	perform cuts to facilitate offset	cuts are performed to facilitate offset
D-10.04.04P	perform cuts to form hip and ridge caps	cuts are performed to form hip and ridge caps

RANGE OF VARIABLES

tools and equipment include: saws, knives, hatchets, shingle cutters, straight edges, tin/metal snips, metal shears

roof penetrations include: vents, valleys, projections

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-10.04.01L	demonstrate knowledge of shingles, their characteristics and applications	define terminology associated with shingles
		identify ***types of shingles***, and describe their characteristics and applications
D-10.04.02L	demonstrate knowledge of procedures to cut shingles	identify ***tools and equipment*** used to cut shingles, and describe their procedures for use
		describe techniques to cut different ***types of shingles***

RANGE OF VARIABLES

types of shingles include: asphalt (three tab, architectural), wood (shakes, shingles), metal (aluminum, steel, copper), rubber, composite

tools and equipment include: saws, knives, hatchets, shingle cutters, straight edges, tin/metal snips, metal shears

D-10.05 Tabs shingles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-10.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-10.05.02P	determine requirements for tabbing shingles	requirements for tabbing shingles is determined according to NBC and manufacturers' specifications

D-10.05.03P	lift shingle without damaging	shingle is lifted without damaging to facilitate application of adhesive
D-10.05.04P	select and apply adhesive	adhesive is selected and applied according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: caulking guns, trowels

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-10.05.01L	demonstrate knowledge of shingles that require tabbing, their characteristics and applications	define terminology associated with shingles that require tabbing
		identify type of shingle that requires tabbing
D-10.05.02L	demonstrate knowledge of procedures to tab shingles	identify ***tools and equipment*** used to tab shingles, and describe their procedures for use
		describe procedures to tab shingles
		identify types of adhesives used to tab shingles
		describe wind proofing methods

RANGE OF VARIABLES

tools and equipment include: caulking guns, trowels

D-10.06 Installs metal flashings for shingled roofs

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-10.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-10.06.02P	determine flashing requirements	flashing requirements are determined according to jurisdictional regulations and job specifications
D-10.06.03P	determine flashing material	flashing material is determined according to compatibility of roofing material

D-10.06.04P	select gauge and colour of flashing	gauge and colour of flashing is selected according to job specifications and jurisdictional regulations
D-10.06.05P	apply flashing	flashing is applied by using overlaps according to jurisdictional regulations and manufacturers' specifications
D-10.06.06P	seal flashing	flashing is sealed according to ***type of application***
D-10.06.07P	select and use fasteners	fasteners are selected and used according to roofing material and deck type
D-10.06.08P	cut and form flashing	flashing is cut and formed according to roof slope

RANGE OF VARIABLES

tools and equipment include: metal shears, tin/metal snips, folding pliers, caulking gun, hammers, drills/drivers

types of applications include: metal valley, counter-flashings, reglet flashings, chimney, penetration flashings, edge flashings

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-10.06.01L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications
D-10.06.02L	demonstrate knowledge of procedures to install metal flashings for shingled roofs	identify types of fasteners used to install metal flashings, and describe their characteristics and applications
		describe procedures to install metal flashings for shingled roofs
		identify material types and compatibility
		identify types of decks and requirements
		identify minimum overlap of metal flashings required for installation
		describe fastening patterns pertaining to installation of metal flashings
D-10.06.03L	demonstrate knowledge of regulatory requirements pertaining to installation of metal flashings for shingled roofs	identify and interpret standards, codes and regulations pertaining to installation of metal flashings for shingled roofs

RANGE OF VARIABLES

types of metal flashings include: drip edge, rake edge, chimney, base, counter, step, thru-wall, back pan, valley, penetration

TASK D-11 Applies roof tiles

TASK DESCRIPTOR

Tiles are selected for roofing material for several reasons, including their longevity, architectural and fire resistant qualities.

D-11.01 Installs battens/strapping for roof tiles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	no	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-11.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-11.01.02P	determine battens/strapping size and layout	battens/strapping size and layout are determined according to manufacturers' specifications
D-11.01.03P	establish layout pattern	layout pattern is established by using measuring tape and chalk lines
D-11.01.04P	identify rafter location and fastening pattern	rafter location and fastening pattern are identified
D-11.01.05P	select ***fasteners*** for battens/strapping	***fasteners*** to be used for battens/strapping are selected
D-11.01.06P	cut, fit and place battens/strapping	battens/strapping is cut, fitted and placed according to job specifications and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: measuring tapes, chalk lines, saws, hammers, drills, batten gauges
fasteners include: screws, nails

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-11.01.01L	demonstrate knowledge of battens/strapping for roof tiles, their characteristics and applications	define terminology associated with battens/strapping for roof tiles
		identify ***types of battens/strapping*** used for roof tiles, and describe their characteristics and applications
D-11.01.02L	demonstrate knowledge of procedures to install battens/strapping for roof tiles	identify ***tools and equipment*** used to install battens/strapping, and describe their procedures for use
		describe procedures to determine layout of battens/strapping
		identify basic skills required to install battens/strapping
		describe procedures to install battens/strapping
		identify types of ***fasteners*** used to install battens/strapping
		identify types of fastening patterns used to install battens/strapping

RANGE OF VARIABLES

types of battens/strapping include: battens, counter-battens, vertical, horizontal
tools and equipment include: measuring tapes, chalk lines, saws, hammers, drills, batten gauges
fasteners include: screws, nails

D-11.02 Fastens roof tiles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	no	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-11.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-11.02.02P	select length and ***type of fastener***	length and ***type of fastener*** are selected according to manufacturers' specifications
D-11.02.03P	establish layout pattern	layout pattern is established according to manufacturers' and design authority specifications

D-11.02.04P	attach tiles to battens/strapping	tiles are attached to battens/strapping according to manufacturers' specifications, environmental conditions and jurisdictional regulations
D-11.02.05P	prevent tile damage during installation	tile damage is prevented during installation by limiting foot traffic on roof tiles

RANGE OF VARIABLES

tools and equipment include: chalk lines, drills, hammers, hatchets, knives, pneumatic nailers
types of fasteners include: nails, screws, clips

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-11.02.01L	demonstrate knowledge of roof tiles, their characteristics and applications	define terminology associated with roof tiles
		identify ***types of roof tiles***, and describe their characteristics and applications
D-11.02.02L	demonstrate knowledge of procedures to fasten roof tiles	identify ***tools and equipment*** used to fasten roof tiles, and describe their procedures for use
		describe procedures to fasten roof tiles
		identify ***types of fasteners*** used to fasten roof tiles
D-11.02.03L	demonstrate knowledge of regulatory requirements pertaining to installation of roof tiles	identify and interpret standards, codes and regulations pertaining to installation of roof tiles

RANGE OF VARIABLES

types of roof tiles include: clay, concrete, slate, metal (aluminum, copper, steel), composites
tools and equipment include: chalk lines, drills, hammers, hatchets, knives, pneumatic nailers
types of fasteners include: nails, screws, clips

D-11.03 Cuts roof tiles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	no	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-11.03.02P	determine cuts	cuts are determined according to ***tile location*** and roof penetrations
D-11.03.03P	perform cuts	cuts are performed to accommodate ***tile location*** and roof penetrations

RANGE OF VARIABLES

tools and equipment include: saws, tile nippers, chalk lines, drills, slate hammer, diamond bit blades, tile cutters, metal snips, metal shears (guillotine), grinders, slate guillotine

tile location includes: valleys, hips, ridges, rakes, penetration

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.03.01L	demonstrate knowledge of procedures to cut roof tiles	identify ***tools and equipment*** used to cut roof tiles, and describe their procedures for use
		describe procedures to cut roof tiles

RANGE OF VARIABLES

tools and equipment include: saws, tile nippers, chalk lines, drills, slate hammer, diamond bit blades, tile cutters, metal snips, metal shears (guillotine), grinders, slate guillotine

D-11.04 Installs closure strips for roof tiles

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	no	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-11.04.02P	identify location and number of closure strips required	location and number of closure strips required are identified according to style and type of tile
D-11.04.03P	secure closure strips	closure strips are secured according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: caulking guns, knives, drills, metal snips, diamond bit blades

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.04.01L	demonstrate knowledge of closure strips, their characteristics and applications	define terminology associated with closure strips
		identify ***types of closure strips***, and describe their characteristics and applications
D-11.04.02L	demonstrate knowledge of procedures to install closure strips	identify ***tools and equipment*** used to install closure strips, and describe their procedures for use
		describe procedures to install closure strips
		describe procedure to determine number of closure strips required to eliminate moisture infiltrations

RANGE OF VARIABLES

types of closure strips include: foam closures, bird stops, screens, metal, clay, concrete
tools and equipment include: caulking guns, knives, drills, metal snips, diamond bit blades

D-11.05 Installs ridge and hip caps

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	no	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-11.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-11.05.02P	determine type of ***adhesive*** and fasteners required	type of ***adhesive*** and fastener required are determined according to type of tile and manufacturers' specifications
D-11.05.03P	mix mortar	mortar is mixed according to manufacturers' specifications and tile colour
D-11.05.04P	apply ***adhesive*** and fasteners where required	***adhesive*** and fasteners are applied where required according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: trowels, mixers, buckets, drills, diamond bit blades, grinders, hammers
adhesives include: mortar, sealants (asphalt roofing cement, polyurethane)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-11.05.01L	demonstrate knowledge of ridges and hip caps, their characteristics and applications	define terminology associated with ridges and hip caps
		identify types of ridges and hip caps, and describe their characteristics and applications
D-11.05.02L	demonstrate knowledge of procedures to install ridges and hip caps	identify ***tools and equipment*** used to install ridge and hip caps, and describe their procedures for use
		describe procedures to install ridge and hip caps
		determine where to apply ***adhesive*** and fasteners
		describe suitable environmental conditions for applying ***adhesive***
		describe mixing and colouring mortar methods

RANGE OF VARIABLES

tools and equipment include: trowels, mixers, buckets, drills, diamond bit blades, grinders, hammers
adhesives include: mortar, sealants (asphalt roofing cement, polyurethane)

D-11.06 Installs metal flashings for tiled roofs

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	no	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-11.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-11.06.02P	determine flashing requirements	flashing requirements are determined according to job-specific requirements and manufacturers' specifications
D-11.06.03P	determine flashing material	flashing material is determined according to compatibility of roofing material and manufacturers' specifications
D-11.06.04P	select gauge and colour of flashing	gauge and colour of flashing is selected according to job specifications and jurisdictional regulations
D-11.06.05P	apply flashing	flashing is applied by using overlaps according to jurisdictional regulations
D-11.06.06P	seal flashing when required	flashing is sealed according to flashing material when required
D-11.06.07P	select and use ***fasteners***	***fasteners*** are selected and used according to metal compatibility
D-11.06.08P	cut and form flashing	flashing is cut and formed according to job-specific requirements

RANGE OF VARIABLES

tools and equipment include: hammers, folding pliers, tin/metal snips, drills/drivers, saws, steamers
fasteners include: nails, screws, rivets, pin bolts, staples

	KNOWLEDGE	
D-11.06.01L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications

D-11.06.02L	demonstrate knowledge of procedures to install metal flashings	identify types of ***fasteners*** used to install metal flashings, and describe their characteristics and applications
		identify ***tools and equipment*** used to install metal flashings, and describe their procedures for use
		describe procedures to install metal flashings
		identify material types and compatibility
		identify types of substrate and requirements
		identify minimum overlap of metal flashings required for installation
		describe fastening patterns pertaining to installation of metal flashings
D-11.06.03L	demonstrate knowledge of regulatory requirements pertaining to installation of metal flashings	identify and interpret standards, codes and regulations pertaining to installation of metal flashings

RANGE OF VARIABLES

types of metal flashings include: drip edge, rake edge, chimney, base, counter, step, thru-wall, back pan, valley, reglet, pan, penetration

fasteners include: nails, screws, rivets, pin bolts, staples

tools and equipment include: hammers, folding pliers, tin/metal snips, drills/drivers, saws, steamers

TASK D-12 Applies preformed metal roofing

TASK DESCRIPTOR

Metal roofs are popular in the warehouse, institutional and commercial construction sectors, especially in full metal buildings. They are also found in residential construction. They are available in a wide variety of colours and profiles.

D-12.01 Installs battens/strapping for preformed metal roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-12.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-12.01.02P	visually inspect roof to ensure roof plane is true and correct deficiencies as required	roof is visually inspected for bowing or sagging of rafters and deck to ensure roof plane is true and correct deficiencies as required
D-12.01.03P	determine battens/strapping size and layout	battens/strapping size and layout are determined according to jurisdictional regulations and style of preformed metal roofing
D-12.01.04P	establish layout pattern	layout pattern is established by using measuring tape and chalk lines
D-12.01.05P	identify rafter location and fastening pattern	rafter location and fastening pattern are identified
D-12.01.06P	select ***fasteners*** for battens/strapping	***fasteners*** to be used for battens/strapping are selected
D-12.01.07P	cut, fit and place battens/strapping	battens/strapping are cut, fitted and placed according to job-specific requirements, manufacturers' specifications and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: measuring tapes, chalk lines, saws, hammers, drills/drivers, metal shears
fasteners include: screws, nails

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-12.01.01L	demonstrate knowledge of battens/strapping for preformed metal roofing, their characteristics and applications	define terminology associated with battens/strapping for preformed metal roofing
		identify ***types of battens/strapping*** used for preformed metal roofing, and describe their characteristics and applications
D-12.01.02L	demonstrate knowledge of procedures to install battens/strapping for preformed metal roofing	identify ***tools and equipment*** used to install battens/strapping, and describe their procedures for use
		describe procedures to determine layout of battens/strapping
		identify basic skills required to install battens/strapping
		describe procedures to install battens/strapping
		identify types and lengths of ***fasteners*** used to install battens/strapping
		identify types of fastening patterns used to install battens/strapping
		describe importance of compatibility of battens/strapping and metal roofing

RANGE OF VARIABLES

types of battens/strapping include: metal, wood, penetration
tools and equipment include: measuring tapes, chalk lines, saws, hammers, drills/drivers, metal shears
fasteners include: screws, nails

D-12.02 Fastens preformed metal roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-12.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-12.02.02P	establish layout pattern	layout pattern is established according to manufacturers' and design authority specifications

D-12.02.03P	install hook strip / concealed clip	hook strip / concealed clip is installed to prevent wind uplift
D-12.02.04P	place panels	panels are placed according to predetermined layout
D-12.02.05P	set driver torque	driver torque is set to prevent damage to screws, washers and panels
D-12.02.06P	determine fastening points	fastening points are determined according to manufacturers' specifications
D-12.02.07P	attach preformed metal panels	preformed metal panels are attached using ***fasteners*** according to manufacturers' specifications and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: hand and power seamers (crimpers), drills/drivers, folding pliers
fasteners include: self-tapping screws, drag screws, concealed clips, nails

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-12.02.01L	demonstrate knowledge of preformed metal roofing, their characteristics and applications	define terminology associated with preformed metal roofing
		identify ***types of preformed metal roofing***, and describe their characteristics and applications
		describe expansion and contraction effects of metal when temperature changes
D-12.02.02L	demonstrate knowledge of procedures to fasten preformed metal roofing	identify ***tools and equipment*** used to fasten preformed metal roofing, and describe their procedures for use
		describe procedures to install hook strips / concealed clips
		describe procedures to fasten preformed metal roofing
		identify types and lengths of ***fasteners*** used to fasten preformed metal panels
D-12.02.03L	demonstrate knowledge of regulatory requirements pertaining to installation of preformed metal roofing	identify and interpret standards, codes and regulations pertaining to installation of preformed metal roofing

RANGE OF VARIABLES

types of preformed metal roofing include: galvanized steel, zinc, aluminum, copper
tools and equipment include: hand and power seamers (crimpers), drills/drivers, folding pliers
fasteners include: self-tapping screws, drag screws, concealed clips, nails

D-12.03 Cuts sheet metal

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.03.01P	select and use ***cutting tools***	***cutting tools*** are selected and used according to task
D-12.03.02P	determine cuts	cuts are determined according to panel location, roof layout and penetrations
D-12.03.03P	perform cuts	cuts are performed to accommodate panel location, roof layout and penetrations

RANGE OF VARIABLES

cutting tools include: nibblers, metal snips, saws, metal shears (guillotine), T-squares, grinders

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.03.01L	demonstrate knowledge of procedures to cut sheet metal	identify types of ***cutting tools*** used to cut sheet metal, and describe their procedures for use
		describe procedures to cut sheet metal

RANGE OF VARIABLES

cutting tools include: nibblers, metal snips, saws, metal shears (guillotine), T-squares, grinders

D-12.04 Installs closure strips for preformed metal roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-12.04.02P	identify location and number of closure strips required	location and number of closure strips required are identified according to style and type of profile
D-12.04.03P	secure closure strips	closure strips are secured according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: drills/drivers, knives, hand riveters, metal snips, measuring tapes, torque wrenches

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.04.01L	demonstrate knowledge of closure strips, their characteristics and applications	define terminology associated with closure strips
		identify ***types of closure strips***, and describe their characteristics and applications
D-12.04.02L	demonstrate knowledge of procedures to secure closure strips	identify ***tools and equipment*** used to install closure strips, and describe their procedures for use
		describe procedures to install closure strips
		describe procedures to determine number of closure strips required to eliminate moisture infiltrations
		identify types and lengths of ***fasteners*** used to secure closure strips

RANGE OF VARIABLES

types of closure strips include: foam, metal

tools and equipment include: drills/drivers, knives, hand riveters, metal snips, measuring tapes, torque wrenches

fasteners include: screws, pop rivets, staples, self-sealing strips

D-12.05 Installs snow guards

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.05.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-12.05.02P	secure snow guards	snow guards are secured by using ***fasteners*** in uniform pattern according to engineer-approved drawings, manufacturers' specifications and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: wrenches, drills, chalk lines, measuring tapes
fasteners include: screws, clips, clamps

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.05.01L	demonstrate knowledge of snow guards, their characteristics and applications	define terminology associated with snow guards
		identify ***types of snow guards***, and describe their characteristics and applications
D-12.05.02L	demonstrate knowledge of procedures to install snow guards	identify ***tools and equipment*** used to install snow guards, and describe their procedures for use
		describe procedures to install snow guards
		identify types of ***fasteners*** used to install snow guards
D-12.05.03L	demonstrate knowledge of regulatory requirements pertaining to installation of snow guards	identify and interpret standards, codes and regulations pertaining to installation of snow guards

RANGE OF VARIABLES

types of snow guards include: metal, plastic
tools and equipment include: wrenches, drills, chalk lines, measuring tapes
fasteners include: screws, clips, clamps

D-12.06 Installs metal flashings for preformed metal roofs

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-12.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to task
D-12.06.02P	determine flashing requirements	flashing requirements are determined according to job and manufacturers' specifications and jurisdictional regulations
D-12.06.03P	determine flashing material	flashing material is determined according to compatibility of preformed metal roofing
D-12.06.04P	select gauge and colour of flashing	gauge and colour of flashing is selected according to job specifications and jurisdictional regulations
D-12.06.05P	cut and form flashing	flashing is cut and formed according to job requirements and jurisdictional regulations
D-12.06.06P	apply flashing	flashing is applied by using overlaps according to job specifications and jurisdictional regulations
D-12.06.07P	seal flashing	flashing is sealed with compatible sealants according to manufacturers' specifications
D-12.06.08P	select and use ***fasteners***	***fasteners*** are selected and used according to metal compatibility, manufacturers' specifications and jurisdictional regulations

RANGE OF VARIABLES

tools and equipment include: metal snips, metal shears (guillotine), folding pliers, drills/drivers, rivet guns, measuring tapes, bevel squares, angle finders

fasteners include: screws, masonry anchors, nails, rivets

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-12.06.01L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications

D-12.06.02L	demonstrate knowledge of procedures to install metal flashings for preformed metal roofs	identify ***tools and equipment*** used to install metal flashings for preformed metal roofs, and describe their procedures for use
		identify types and lengths of ***fasteners*** used to install metal flashings, and describe their characteristics and applications
		describe procedures to install metal flashings
		identify material types and compatibility
		identify types of substrates and requirements
		identify minimum overlap of metal flashings required for installation
		describe fastening patterns pertaining to installation of metal flashings
D-12.06.03L	demonstrate knowledge of regulatory requirements pertaining to installation of metal flashings	identify and interpret standards, codes and regulations pertaining to installation of metal flashings

RANGE OF VARIABLES

types of metal flashings include: drip edge, rake edge, chimney, base, counter, step, thru-wall, back pan, valley, cap, hook strips / wind clips, penetration

tools and equipment include: metal snips, metal shears (guillotine), folding pliers, drills/drivers, rivet guns, measuring tapes, bevel squares, angle finders

fasteners include: screws, masonry anchors, nails, rivets

MAJOR WORK ACTIVITY E

Waterproofs and damp-proofs surfaces

TASK E-13 Waterproofs surfaces

TASK DESCRIPTOR

Waterproofing is defined as the treatment of a surface or structure to prevent the passage of water under hydrostatic pressure. Waterproofing applications are done on vertical, horizontal and subgrade surfaces. Waterproofing components include primers, insulation and membranes. Waterproofing applications are associated with protected membrane assemblies (PMA), exposed applications, and green, sustainable or vegetative waterproofing systems.

E-13.01 Prepares waterproofing substrates

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-13.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and industry practices
E-13.01.02P	identify ***below-grade hazards***	***below-grade hazards*** are identified according to jurisdictional safety regulations
E-13.01.03P	inspect substrate for ***defects***, debris, moisture and curing	substrate is inspected for ***defects***, debris, moisture and curing according to industry practices and procedures, and manufacturers' written instructions
E-13.01.04P	clean and dry surface	surface is cleaned and dried using ***tools and equipment*** according to industry practices and procedures
E-13.01.05P	fill cracks and voids with compatible product	cracks and voids are filled with compatible product according to manufacturers' specifications
E-13.01.06P	barricade area	area is barricaded to prevent contamination of work surface
E-13.01.07P	select ***method of application of primer***	***method of application of primer*** is selected according to ***type of primer*** and ***surface to be waterproofed***

E-13.01.08P	apply primer	primer is applied according to manufacturers' specifications
E-13.01.09P	allow primer to set or flash off completely	primer is allowed to set or flash off completely according to manufacturers' specifications and environmental conditions

RANGE OF VARIABLES

tools and equipment include: brooms, scrapers, torches, blowers, sprayers, rollers, squeegees, melters, fire extinguishers, pressure washers, grinders, pumps

below-grade hazards include: cave-ins from dirt or rocks, uneven working surface, standing water, buried utility lines, un-shored slopes, inadequate access and egress, confined spaces and ventilation

defects include: sharp edges, exposed rebars, holes, cracks, uneven surfaces, protrusions

methods of application of primer include: rolling, brushing, spraying, squeegeeing

types of primers include: water-based, solvent-based

surfaces to be waterproofed include: concrete, masonry, wood, metal

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-13.01.01L	demonstrate knowledge of procedures to prepare waterproofing substrates	describe procedures to prepare waterproofing substrates
		identify types of ***surfaces to be waterproofed***, and describe their characteristics
		identify ***types of primers***, and describe their characteristics and applications
		describe ***methods of application of primer***

RANGE OF VARIABLES

surfaces to be waterproofed include: concrete, masonry, wood, metal

types of primers include: water-based, solvent-based

methods of application of primer include: rolling, brushing, spraying, squeegeeing

E-13.02 Applies waterproofing membrane

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-13.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and industry practices
E-13.02.02P	select ***type of waterproofing membrane***	***type of waterproofing membrane*** is selected according to site-specific requirements
E-13.02.03P	install waterproofing membrane	waterproofing membrane is installed according to manufacturers' specifications and site-specific requirements
E-13.02.04P	apply ***reinforcing ply***	***reinforcing ply*** is applied according to manufacturers' specifications
E-13.02.05P	install ***protection layer***	***protection layer*** is installed according to manufacturers' specifications and site-specific requirements

RANGE OF VARIABLES

tools and equipment include: torches, melters, squeegees, hot buckets, rollers, sprayers, trowels, mops, fire extinguishers

types of waterproofing membranes include: asphalt built-up, hot liquid-applied modified asphalt, modified bitumen sheet, thermoset (butyl, EPDM), thermoplastic (PVC, TPO), fluid-applied elastomeric materials, bentonite, metallic waterproofing, cementitious waterproofing, crystalline waterproofing, hot rubber, cold process, self-adhered membranes

reinforcing plies includes: polyester, fibreglass mats, organic

protection layers include: sanded base sheet, rigid asphalt board, polyethylene sheet, geo-textile fabric, drainage board, extruded polystyrene (XPS), expanded polystyrene (EPS)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-13.02.01L	demonstrate knowledge of waterproofing membranes, their characteristics and applications	define terminology associated with waterproofing membranes
		identify ***types of waterproofing membranes***, and describe their characteristics and applications
E-13.02.02L	demonstrate knowledge of procedures to apply waterproofing membranes	identify ***tools and equipment*** used to apply waterproofing membranes, and describe their procedures for use

		identify types of ***reinforcing plies***, and describe their procedures for use
		identify types of ***protection layers***, and describe their procedures for use
		describe procedures to apply waterproofing membranes and ***reinforcing plies***
		describe procedures to install ***protection layers***
		describe effects of environmental conditions on application
E-13.02.03L	demonstrate knowledge of regulatory requirements pertaining to the installation of waterproofing membranes	identify and interpret standards, codes and regulations pertaining to the installation of waterproofing membranes

RANGE OF VARIABLES

types of waterproofing membranes include: asphalt built-up, hot liquid-applied modified asphalt, modified bitumen sheet, thermoset (butyl, EPDM), thermoplastic (PVC, TPO), fluid-applied elastomeric materials, bentonite, metallic waterproofing, cementitious waterproofing, crystalline waterproofing, hot rubber, cold process, self-adhered membranes

tools and equipment include: torches, melters, squeegees, hot buckets, rollers, sprayers, trowels, mops, fire extinguishers

reinforcing plies includes: polyester, fibreglass mats, organic

protection layers include: sanded base sheet, rigid asphalt board, polyethylene sheet, geo-textile fabric, drainage board, extruded polystyrene (XPS), expanded polystyrene (EPS)

E-13.03 Installs green, sustainable, vegetative and protected membrane components

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-13.03.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and industry practices
E-13.03.02P	visually inspect protection layer for ***defects***	protection layer is visually inspected for ***defects***
E-13.03.03P	repair protection layer and waterproof membrane as needed	protection layer and waterproof membrane are repaired as needed

E-13.03.04P	apply ***overburden components***	***overburden components*** are applied according to site specifications
E-13.03.05P	apply ***green, sustainable, vegetative and protected membrane components***	***green, sustainable, vegetative and protected membrane components*** are applied according to manufacturers' and site specifications

RANGE OF VARIABLES

tools and equipment include: wheelbarrows, cranes, aggregate buckets, shovels, conveyors, torches, rakes

defects include: holes, gouges, debris, laps

overburden components include: drainage board, extruded polystyrene insulation, filter fabrics, ballast, growing medium, pavers

green, sustainable and vegetative and protected membrane components include: root barriers, moisture retention mats, irrigation system, growing medium, vegetation

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-13.03.01L	demonstrate knowledge of ***green, sustainable, vegetative and protected membrane components***, their characteristics and applications	define terminology associated with ***green, sustainable, vegetative and protected membrane components***
		identify types of ***green, sustainable, vegetative and protected membrane components***, and describe their characteristics and applications
E-13.03.02L	demonstrate knowledge of procedures to install ***green, sustainable, vegetative and protected membrane components***	identify ***tools and equipment*** used to install ***green, sustainable, vegetative and protected membrane components***, and describe their procedures for use
		describe procedures to install ***green, sustainable, vegetative and protected membrane components***
		describe leak detection methods for green, sustainable, vegetative and protected membrane installations
		describe procedures to repair protection layer and waterproof membrane
		describe irrigation systems in green and vegetative waterproofing
		describe importance of root barriers
		describe drainage systems in green and vegetative waterproofing
		describe effects of environmental conditions on application

		identify roof's ***vegetative-free zones***
E-13.03.03L	demonstrate knowledge of regulatory requirements pertaining to installation of ***green, sustainable, vegetative and protected membrane components***	identify and interpret standards, codes and regulations pertaining to installation of ***green, sustainable, vegetative and protected membrane components***

RANGE OF VARIABLES

green, sustainable and vegetative and protected membrane components include: root barriers, moisture retention mats, irrigation system, growing medium, vegetation

tools and equipment include: wheelbarrows, cranes, aggregate buckets, shovels, conveyors, torches, rakes

vegetative-free zones include: around drains, perimeter, roof penetrations, rooftop units

TASK E-14 Damp-proofs surfaces

TASK DESCRIPTOR

Damp-proofing is the treatment of a surface or structure to resist the passage of water in the absence of hydrostatic pressure. Damp-proofing methods are generally employed to reduce dampness within the structure above grade, or below grade in the absence of ground water. Installations do not require a membrane and can be completed with single or multi-coat applications.

E-14.01 Applies damp-proofing materials

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-14.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and industry practices
E-14.01.02P	identify ***below-grade hazards***	***below-grade hazards*** are identified according to jurisdictional safety regulations

E-14.01.03P	inspect substrate for ***defects***, debris, moisture and curing	substrate is inspected for ***defects***, debris, moisture and curing according to industry practices and procedures, and manufacturers' written instructions
E-14.01.04P	prepare surface to accept ***damp-proofing material***	surface is prepared by cleaning, scraping, and priming according to industry practices and procedures, and manufacturers' specifications
E-14.01.05P	select and install ***damp-proofing material***	***damp-proofing material*** is selected and installed according to site-specific requirements and manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: trowels, brushes, rollers, spray applicators, torches, pressure washers, grinders, pumps

below-grade hazards include: cave-ins from dirt or rocks, uneven working surface, buried utility lines, un-shored slopes, confined spaces and ventilation, overhead hazards

defects include: sharp edges, exposed rebars, holes, cracks, uneven surfaces, protrusions

damp-proofing materials include: solvent-based mastic damp-proofing, bituminous emulsion damp-proofing materials, bituminous membranes, polyethylene, polystyrene

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-14.01.01L	demonstrate knowledge of ***damp-proofing materials***, their characteristics and applications	define terminology associated with ***damp-proofing materials***
		identify types of ***damp-proofing materials***, and describe their characteristics and applications
E-14.01.02L	demonstrate knowledge of procedures to apply ***damp-proofing materials***	identify ***tools and equipment*** used to apply ***damp-proofing materials***, and describe their procedures for use
		describe ***methods for applying damp-proofing materials***
		describe effects of environmental conditions on application
		identify number of coats required and set-up time between coats
E-14.01.03L	demonstrate knowledge of regulatory requirements pertaining to application of ***damp-proofing materials***	identify and interpret standards, codes and regulations pertaining to application of ***damp-proofing materials***

RANGE OF VARIABLES

damp-proofing materials include: solvent-based mastic damp-proofing, bituminous emulsion damp-proofing materials, bituminous membranes, polyethylene, polystyrene

tools and equipment include: trowels, brushes, rollers, spray applicators, torches, pressure washers, grinders, pumps

methods for applying damp-proofing materials include: spraying, rolling, brushing, trowelling, torching

E-14.02 Applies protection layer

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-14.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and industry practices
E-14.02.02P	select ***protection layer***	***protection layer*** is selected according to manufacturers' and site specifications
E-14.02.03P	cut, fit and place ***protection layer***	***protection layer*** is cut, fitted and placed according to manufacturers' specifications and industry practices
E-14.02.04P	secure ***protection layer***	***protection layer*** is secured using ***application products*** according to manufacturers' specifications and industry practices

RANGE OF VARIABLES

tools and equipment include: hammer drills, trowels, caulking guns, knives, powder actuated tools

protection layers include: asphalt boards, rigid insulations, geo-textiles, drainage boards

application products include: adhesives, fasteners

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-14.02.01L	demonstrate knowledge of ***protection layers***, their characteristics and applications	define terminology associated with ***protection layers***
		identify types of ***protection layers***, and describe their characteristics and applications
E-14.02.02L	demonstrate knowledge of procedures to apply ***protection layers***	identify ***tools and equipment*** used to apply ***protection layers***, and describe their procedures for use

		describe procedures to install ***protection layers***
		identify types of ***application products*** used to secure ***protection layers***
		identify backfill requirements used after application
E-14.02.03L	demonstrate knowledge of regulatory requirements pertaining to application of ***protection layers***	identify and interpret standards, codes and regulations pertaining to application of ***protection layers***

RANGE OF VARIABLES

protection layers include: asphalt boards, rigid insulations, geo-textiles, drainage boards
tools and equipment include: hammer drills, trowels, caulking guns, knives, powder actuated tools
application products include: adhesives, fasteners

MAJOR WORK ACTIVITY F

Assesses, maintains and repairs roof

TASK F-15 Assesses roof condition

TASK DESCRIPTOR

Roofers assess roof conditions to determine what actions are required to maintain a roof's performance.

F-15.01 Performs roof inspections

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-15.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to industry practices
F-15.01.02P	discuss problem areas with client or occupant	discussions with client or occupant are held to investigate leaks and potential causes
F-15.01.03P	identify ***type of roofing system***	***type of roofing system*** is identified
F-15.01.04P	visually inspect building structure for signs of environmental and physical damage	building structure is visually inspected for signs of environmental and physical damage to identify extent of damage and area to be maintained or repaired
F-15.01.05P	identify areas of roof that require immediate or future repair	areas of roof that require immediate or future repair are identified by performing visual inspection for ***defects and deficiencies***
F-15.01.06P	identify ***cause of defects and deficiencies***	***cause of defects and deficiencies*** are identified
F-15.01.07P	record and report inspection observations	inspection observations are recorded and reported

RANGE OF VARIABLES

tools and equipment include: cameras, core cutters (cut tester), portable recording devices, thermal scanning equipment, moisture probes, drones

types of roofing systems include: single ply, modified bitumen, built-up roofing, inverted roofing, low slope and steep slope roofing

defects and deficiencies include: leaks, alligatoring, bare spots, ballast displacement, deteriorated caulking and sealants, deteriorated membranes, blisters, wrinkles, bad laps, mechanical fasteners, loose, missing and damaged tiles, flashings and shingles, penting (single-ply)

cause of defects and deficiencies include: flawed or inappropriate roof or building design, faulty workmanship, defective materials, building movement, abuse, lack of timely, appropriate roof maintenance, age-related weathering and deterioration of roofing system components, environmental conditions, lack of insulation

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-15.01.01L	demonstrate knowledge of roofing systems, their characteristics and applications	define terminology associated with roofing systems
		identify ***types of roofing systems***, and describe their characteristics and applications
F-15.01.02L	demonstrate knowledge of procedures to perform roof inspections	identify ***tools and equipment*** used to perform roof inspections, and describe their procedures for use
		describe procedures to perform roof inspections
		describe when to inspect roof
		identify where to look for ***defects and deficiencies***
		identify history of leaks and past repairs
		identify types of ***defects and deficiencies***
		identify ***potential causes of damage***
		identify composition of roof

RANGE OF VARIABLES

types of roofing systems include: single ply, modified bitumen, built-up roofing, inverted roofing, low slope and steep slope roofing

tools and equipment include: cameras, core cutters (cut tester), portable recording devices, thermal scanning equipment, moisture probes, drones

defects and deficiencies include: leaks, alligatoring, bare spots, ballast displacement, deteriorated caulking and sealants, deteriorated membranes, blisters, wrinkles, bad laps, mechanical fasteners, loose, missing and damaged tiles, flashings and shingles, penting (single-ply)

potential causes of damage include: extreme weather events, maintenance personnel, vandalism, animals

F-15.02 Performs cut test

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
F-15.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to industry practices
F-15.02.02P	test roofing system components	roofing system components are tested by removing a sample area
F-15.02.03P	record and report cut test ***findings***	cut test ***findings*** are recorded and reported
F-15.02.04P	patch cut test area temporarily or permanently	cut test area is patched temporarily or permanently

RANGE OF VARIABLES

tools and equipment include: saws, knives, trowels, cameras, thermal scanning equipment, core cutters (cut tester), moisture detection devices, torches, measuring tapes, hot-air welders, adhesives

findings include: roofing system components, moisture, contamination, deterioration

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-15.02.01L	demonstrate knowledge of procedures to perform a cut test	identify ***tools and equipment*** used to perform a cut test, and describe their procedures for use
		describe procedures to perform a cut test
		describe when and where to perform a cut test
		describe procedures to patch area where a cut test was performed

RANGE OF VARIABLES

tools and equipment include: saws, knives, trowels, cameras, thermal scanning equipment, core cutters (cut tester), moisture detection devices, torches, measuring tapes, hot-air welders, adhesives

F-15.03 Determines maintenance or repair required

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
F-15.03.01P	determine ***next steps***	***next steps*** are determined according to cut test and inspection results
F-15.03.02P	determine feasibility of maintenance or repair	feasibility of maintenance or repair is determined according to roofing system condition
F-15.03.03P	determine timeframe required for inspections and preventative maintenance	timeframe required for inspections and preventative maintenance is determined according to manufacturers' warranty and client requirements
F-15.03.04P	determine if temporary or permanent repair can be performed	temporary or permanent repair is determined according to results of inspection and roof condition
F-15.03.05P	inform client of inspection report results and recommendations for ***next steps***	client is informed of inspection report results and recommendations for ***next steps***

RANGE OF VARIABLES

next steps are: additional investigation, maintenance, repair or replacement

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-15.03.01L	demonstrate knowledge of procedures to determine maintenance or repair required on roofing system	describe procedures to determine maintenance or repair required on roofing system
		identify ***types of maintenance*** performed on a roofing system
		describe procedures used to determine timeframe required for inspections and preventative maintenance
		identify repair methods

RANGE OF VARIABLES

types of maintenance include: caulking, refilling penetration pockets, securing loose flashing, replacing deteriorated roofing components, replacing deteriorated steep slope roofing materials, clearing drainage systems

TASK F-16 Maintains and repairs low slope roofing

TASK DESCRIPTOR

Roofers perform roof maintenance and repair of low slope roofing to address normal wear and damage in order to extend the service life of roofing systems.

F-16.01 Maintains low slope roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-16.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to industry practices
F-16.01.02P	remove ***obstructions*** from drains, scuppers and gutters	***obstructions*** are removed from drains, scuppers and gutters
F-16.01.03P	dismantle and reassemble ***drain components***	***drain components*** are dismantled and reassembled to reseal
F-16.01.04P	reseal drains and scuppers	drains and scuppers are resealed to return to serviceable condition
F-16.01.05P	verify penetration pocket is well secured	penetration pocket is well secured without separations
F-16.01.06P	clean surface of existing sealant	surface of existing sealant is cleaned for adhesion of replacement sealant
F-16.01.07P	apply sealant compatible with roofing system	sealant compatible with roofing system is applied according to manufacturers' specifications
F-16.01.08P	remove old caulking	old caulking is removed by using ***methods***
F-16.01.09P	clean, dry and prime surface prior to maintenance	surface is cleaned, dried and primed prior to maintenance
F-16.01.10P	reseal membranes	membranes are resealed to serviceable condition according to type of membrane
F-16.01.11P	determine application methods of surfacing	application methods of surfacing are determined according to type of roof membrane
F-16.01.12P	resurface membrane with ***materials***	membrane is resurfaced with ***materials***
F-16.01.13P	reinstall ***fasteners***	***fasteners*** are reinstalled to secure roofing components
F-16.01.14P	select type and colour of caulking	type and colour of caulking is selected to match adjacent finishes

F-16.01.15P	reapply caulking	caulking is reapplied using caulking gun and tooling
F-16.01.16P	remove excessive snow and ice from roof	excessive snow and ice are removed without causing damage to roofing materials

RANGE OF VARIABLES

tools and equipment include: wrenches, drills/drivers, caulking guns, blowers, trowels, knives, scrapers, hammers, glazing bars, torches, kettles, melters, hot air welding equipment, rollers, shovels, brooms, pry-bars, tin/metal snips, hatchets, PPE

obstructions include: debris, vegetation, construction material

drain components include: clamps, strainer baskets, drain hardware, backflow preventers

methods include: pulling, scraping, cutting

materials include: granules, aggregate, coatings, ballast

fasteners include: screws, nails, clips

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-16.01.01L	demonstrate knowledge of ***tools and equipment*** used for maintenance of low slope roofing	identify ***tools and equipment*** used to maintain low slope roofing and describe their procedures for use
F-16.01.02L	demonstrate knowledge of roof drains, gutters and scuppers, their components, characteristics and applications	define terminology associated with roof drains, gutters and scuppers, and their components
		identify ***types of drains, gutters and scuppers***, and describe their characteristics and applications
		identify ***drain components***, and describe their characteristics and applications
F-16.01.03L	demonstrate knowledge of procedures to maintain roof drains, gutters and scuppers	describe procedures to maintain roof drains, gutters and scuppers
		describe procedures to dismantle and reassemble roof drains, gutters and scuppers, and ***drain components***
		describe procedures to seal roof drains, gutters and scuppers
F-16.01.04L	demonstrate knowledge of penetration pockets, their characteristics and applications	define terminology associated with penetration pockets
		identify ***types of penetration pockets***, and describe their characteristics and applications
F-16.01.05L	demonstrate knowledge of procedures to refill penetration pockets	describe procedures to refill penetration pockets
		identify ***types of sealants*** used to seal penetration pockets

		describe effect of ***environmental conditions*** on sealants
		identify curing times for sealants
F-16.01.06L	demonstrate knowledge of caulking, its characteristics and applications	define terminology associated with caulking
		identify ***types of caulking***, and describe their characteristics and application
F-16.01.07L	demonstrate knowledge of procedures to replace deteriorated caulking	describe ***methods*** used to remove old caulking
		describe effect of ***environmental conditions*** on caulking
		identify curing times for caulking
F-16.01.08L	demonstrate knowledge of membranes, their characteristics and applications	define terminology associated with membranes
		identify types of membranes, and describe their characteristics and applications
F-16.01.09L	demonstrate knowledge of ballast/surfacing, their characteristics and applications	define terminology associated with ballast/surfacing
		identify ***types of ballast/surfacing***, and describe their characteristics and applications
		describe effects of ***environmental conditions*** on surfaces
F-16.01.10L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications
F-16.01.11L	demonstrate knowledge of procedures to re-secure loose metal flashings	describe procedures used to re-secure loose metal flashings
		identify types of ***fasteners*** used to re-secure metal flashings
F-16.01.12L	demonstrate knowledge of excessive snow and ice removal practices	describe procedures for removing snow
		describe procedures for removing ice

RANGE OF VARIABLES

tools and equipment include: wrenches, drills/drivers, caulking guns, blowers, trowels, knives, scrapers, hammers, glazing bars, torches, kettles, melters, hot air welding equipment, rollers, shovels, brooms, pry-bars, tin/metal snips, hatchets, PPE

types of drains, gutters and scuppers include: internal, external, overflow

drain components include: clamps, strainer baskets, drain hardware, backflow preventers

types of penetration pockets include: metal, composite

types of sealants include: mastic, pourable sealer, rubberized asphalt (polybitumen)

environmental conditions include: temperature, wind, moisture

types of caulking include: silicone, polyurethane, latex, general-purpose

methods include: pulling, scraping, cutting

types of ballast/surfacing include: granular, coating, aggregate, pavers, rigid insulation

types of metal flashings include: wall, base, parapet, cap, termination, reglet, drip edge, aggregate stop, thru-wall, saddle

fasteners include: screws, nails, clips

F-16.02 Repairs low slope roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
F-16.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to industry practices
F-16.02.02P	remove and replace damaged ***roofing materials***	damaged ***roofing materials*** are removed and replaced
F-16.02.03P	remove and replace ***components***	***components*** are removed and replaced according to industry practices
F-16.02.04P	reposition and re-secure displaced ***roofing materials***	displaced ***roofing materials*** are repositioned and re-secured according to industry practices

RANGE OF VARIABLES

tools and equipment include: caulking guns, torches, trowels, scrapers, brooms, mops, shovels, hot air welding equipment, blowers

roofing materials include: roof membranes, liquid-applied materials, ballast, mastics, sealers, insulation

components include: vent stacks, pipe boots, penetration (roof anchors, gas lines, steel beam) flashings, penetration pockets

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-16.02.01L	demonstrate knowledge of procedures to repair low slope roofing	identify ***tools and equipment*** used to repair low slope roofing, and describe their procedures for use
		describe procedures used to remove and replace ***roofing materials*** and ***components***
F-16.02.02L	demonstrate knowledge of procedures to repair ***membrane defects***	describe ***techniques*** used to repair ***membrane defects***
F-16.02.03L	demonstrate knowledge of procedures to reapply surfacing/ballast to bare areas	describe procedures used to reapply surfacing/ballast to bare areas
		determine when surface requires resurfacing
		describe importance of compatibility of materials used

RANGE OF VARIABLES

tools and equipment include: caulking guns, torches, trowels, scrapers, brooms, mops, shovels, hot air welding equipment, blowers

roofing materials include: roof membranes, liquid-applied materials, ballast, mastics, sealers, insulation

components include: vent stacks, pipe boots, penetration (roof anchors, gas lines, steel beam) flashings, penetration pockets

membrane defects include: blisters, ridges, splits, rips, delamination, laps

techniques include: hot application, cold application, troweling, de-granulating

TASK F-17 Maintains and repairs steep slope roofing

TASK DESCRIPTOR

Roofers perform roof maintenance and repair of steep slope roofing to address normal wear and damage in order to extend the service life of roofing systems.

F-17.01 Maintains steep slope roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-17.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to industry practices
F-17.01.02P	select ***roofing materials*** required for maintenance	***roofing materials*** required for maintenance are selected
F-17.01.03P	remove ***obstructions*** from gutters	***obstructions*** are removed from gutters
F-17.01.04P	dismantle and reassemble ***gutter components***	***gutter components*** are dismantled and reassembled to reseal
F-17.01.05P	reseal gutter seams	gutter seams are resealed to return to serviceable condition
F-17.01.06P	verify penetration flashings are well-secured	penetration flashings are well secured without separations
F-17.01.07P	select and use sealant compatible with roofing system	sealant compatible with roofing system is selected and used
F-17.01.08P	install new sealer	new sealer is installed according to manufacturers' specifications
F-17.01.09P	remove old caulking	old caulking is removed by using ***methods***
F-17.01.10P	clean, dry and prime surface prior to maintenance	surface is cleaned, dried and primed prior to maintenance
F-17.01.11P	reinstall ***fasteners***	***fasteners*** are reinstalled to secure metal flashings and ***roofing materials***
F-17.01.12P	select type and colour of caulking	type and colour of caulking is selected to match adjacent finishes
F-17.01.13P	reapply caulking	caulking is reapplied using caulking gun and tooling
F-17.01.14P	remove excessive snow and ice from roof	excessive snow and ice are removed without causing damage to roofing materials

RANGE OF VARIABLES

tools and equipment include: wrenches, drills/drivers, caulking guns, blowers, trowels, knives, hammer, glazing bars, rollers, shovels, brooms, pry-bars, rippers, grinders, seamers, clamps, tin/metal snips, hatchets, PPE

roofing materials include: shingles, tiles, sheet metal, mastics, fasteners

obstructions include: debris, vegetation, construction material

gutter components include: downpipes, end caps, elbows, screens, heat tracing

methods include: pulling, scraping, cutting

fasteners include: screws, nails, clips

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-17.01.01L	demonstrate knowledge of ***tools and equipment*** used for maintenance of steep slope roofing	identify ***tools and equipment*** used to maintain steep slope roofing and describe their procedures for use
F-17.01.02L	demonstrate knowledge of roof drainage systems, their characteristics and applications	define terminology associated with roof drainage systems, and ***gutter components***
		identify ***types of gutters***, describe their characteristics and applications
		identify ***gutter components***, describe their characteristics and applications
F-17.01.03L	demonstrate knowledge of procedures to maintain roof drainage systems	describe procedures to maintain roof drainage systems
		describe procedures to dismantle and reassemble roof drainage systems, and ***gutter components***
		describe procedures to seal roof gutters
F-17.01.04L	demonstrate knowledge of penetration flashings, their characteristics and applications	define terminology associated with penetration flashings
		identify ***types of penetration flashings***, and describe their characteristics and applications
F-17.01.05L	demonstrate knowledge of procedures to maintain penetration flashings	describe procedures to maintain penetration flashings
		identify ***types of sealants*** used to seal penetration flashings
		describe effect of ***environmental conditions*** on sealants
F-17.01.06L	demonstrate knowledge of caulking, its characteristics and applications	define terminology associated with caulking
		identify ***types of caulking***, and describe their characteristics and application
F-17.01.07L	demonstrate knowledge of procedures to replace deteriorated caulking	describe ***methods*** used to remove old caulking

		describe effect of ***environmental conditions*** on caulking
		identify curing times for caulking
F-17.01.08L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications
F-17.01.09L	demonstrate knowledge of procedures to re-secure loose metal flashings	describe procedures used to re-secure loose metal flashings
		identify types of ***fasteners*** used to re-secure metal flashings
F-17.01.10L	demonstrate knowledge of excessive snow and ice removal practices	describe procedures for removing snow
		describe procedures for removing ice

RANGE OF VARIABLES

tools and equipment include: wrenches, drills/drivers, caulking guns, blowers, trowels, knives, hammer, glazing bars, rollers, shovels, brooms, pry-bars, rippers, grinders, seamers, clamps, tin/metal snips, hatchets, PPE

gutter components include: downpipes, end caps, elbows, screens, heat tracing

types of gutters include: internal, external

types of penetration flashings include: metal, flexible, composite

types of sealants include: mastic, polyurethane, silicone, rubberized asphalt (polybitumen)

environmental conditions include: temperature, wind, moisture

types of caulking include: silicone, polyurethane, latex, general-purpose

methods include: pulling, scraping, cutting

types of metal flashings include: wall, base, parapet, cap, termination, reglet, drip edge, aggregate stop, thru-wall, saddle

fasteners include: screws, nails, clips

F-17.02 Repairs steep slope roofing

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
NV	yes	NV	yes	NV	yes	yes	yes	NV	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
F-17.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to industry practices
F-17.02.02P	remove and replace damaged ***roofing materials***	damaged ***roofing materials*** are removed and replaced

F-17.02.03P	replace and reinstall ***gutter components***	***gutter components*** are replaced and reinstalled according to industry practices
F-17.02.04P	install ***fasteners***	***fasteners*** are installed to secure flashings and ***roofing materials***
F-17.02.05P	remove and replace ***components***	***components*** are removed and replaced according to industry practices
F-17.02.06P	reposition or replace and re-secure displaced ***roofing materials***	displaced ***roofing materials*** are repositioned or replaced and re-secured
F-17.02.07P	apply caulking	caulking is applied according to manufacturers' specifications to ensure seal of flashing

RANGE OF VARIABLES

tools and equipment include: wrenches, screwdrivers, caulking guns, blowers, trowels, knives, hammers, glazing bars, rollers, shovels, brooms, pry-bars, rippers, drills, grinders, seamers, clamps, tin/metal snips, hatchets, PPE

roofing materials include: shingles, tiles, sheet metal, mastics, underlayments, ice guards

gutter components include: downpipes, end caps, elbows, screens, heat tracing

fasteners include: screws, nails, clips

components include: vent stacks, pipe boots, penetration flashings, skylights

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-17.02.01L	demonstrate knowledge of procedures to repair steep slope roofing	identify ***tools and equipment*** used to repair steep slope roofing, and describe their procedures for use
		describe procedures used to remove and replace ***roofing materials***, drainage systems and ***components***
F-17.02.02L	demonstrate knowledge of metal flashings, their characteristics and applications	define terminology associated with metal flashings
		identify ***types of metal flashings***, and describe their characteristics and applications
F-17.02.03L	demonstrate knowledge of procedures to re-secure loose metal flashings or install new flashings	identify ***tools and equipment*** used to re-secure loose metal flashings, and describe their procedures for use
		describe procedures used to re-secure loose metal flashings
		identify types of ***fasteners*** used to re-secure metal flashings

RANGE OF VARIABLES

tools and equipment include: wrenches, screwdrivers, caulking guns, blowers, trowels, knives, hammers, glazing bars, rollers, shovels, brooms, pry-bars, rippers, drills, grinders, seamers, clamps, tin/metal snips, hatchets, PPE

roofing materials include: shingles, tiles, sheet metal, mastics, underlayments, ice guards

components include: vent stacks, pipe boots, penetration flashings, skylights

types of metal flashings include: drip edge, rake edge, chimney, base, counter, step, thru-wall, back pan, valley, reglet, pan, cap

fasteners include: screws, nails, clips

APPENDIX A
ACRONYMS

AARS	adhesive adhered roofing system
APP	atactic polypropylene polymers
AHJ	authorities having jurisdiction
BUR	built-up roofing
CRCA	Canadian Roofing Contractors Association
CSA	Canadian Standards Association
EPDM	ethylene propylene diene monomer
EVT	equiviscous temperatures
EPS	expanded polystyrene
GFCIs	ground fault circuit interrupters
KEE	ketone ethylene ester
LVOC	low-volatile organic compounds
MARS	mechanically attached roofing system
NBC	National Building Code
PARS	partially adhered roofing system
PPE	personal protective equipment
PV	photovoltaic
PMMA	polymethyl-methacrylate
PVC	polyvinyl chloride
PMA	protected membrane assemblies
SBS	styrene-butadiene styrene
SEBS	styrene-ethylene-butylene styrene
TPO	thermoplastic polyolefin
UV	ultraviolet
WHMIS	Workplace Hazardous Materials Information System
XPS	extruded polystyrene

APPENDIX B
TOOLS AND EQUIPMENT/OUTILS ET ÉQUIPEMENT

Personal Protective Equipment (PPE) and Safety Equipment / Équipement de sécurité et de protection individuelle

cuffless pants	pantalon sans revers
eye protection (goggles, glasses)	protection oculaire (lunettes de protection, lunettes)
eye wash bottle	douche oculaire
face shield	écran facial
fall protection equipment (lanyards, rope grabs, safety harness, anchors, lifeline)	protection anti-chute (ligne d'avertissement, coulissons, harnais de sécurité, ancrages, corde de sécurité)
fire extinguisher	extincteur
hand protection	protection des mains
guardrails	garde-corps
first aid kit	trousse de premiers soins
hard hat	casque de sécurité
hearing protection	protecteur auditif
heat sensors	détecteur de chaleur
high visibility vest	gilet à haute visibilité
long sleeves	manches longues
dust mask	masque anti-poussière
knee pads	genoullières
respirator	appareil respiratoire
safety footwear	bottes de sécurité
safety fence	clôture de sécurité
sun protection	protection contre le soleil

Hand Tools / Outils à main

adhesive spreader	épandeur à adhésif
air and material hoses	boyaux à air et à matériaux
aviation snips (left and right handed, straight)	cisailles aviation (pour gaucher et droitier, à coupe droite)
axe	hache
batten gauge	mesure d'écartement
bevel square	fausse équerre
broom	balai
bucket/pail	seau
caulking gun	pistolet à calfeutrer
chalk line	cordeau à craie
chisels	burin
core cutters (cut tester)	perceuses à carotte
dollies	chariots
drying mop	vadrouille d'assèchement
flashlight	lampe de poche
folding pliers	plieuses manuelles
grub hoe	pioche
hacksaw	scie à métaux
hammer	marteau

hammer stapler	agrafeuse-marteau
hand saw	scie à main
hand seamer	pinces à plier et agrafer les tôles
hand spudder	grattoir à main
hand roller	rouleau à bras
hatchet	hache
keyhole saw	scie passe-partout
magnetic bar	balai magnétique
manual gravel spreader	épandeuse à gravier manuelle
manual insulation carrier	transporteur d’isolant manuel
measuring tape	ruban à mesurer
mechanical tape applicator	applicateur mécanique de ruban à coller
mop	vadrouille
pinch bar	barre-levier
pipe wrench	clé à tuyau
plane	rabot
pop riveter	riveteuse pop
pry bar	barre de démolition
rake	râteau
roof jack	support de fixation rapide
roof lifter	poussoir de couverture
roofer knife	couteau de couvreur
sawhorse	chevalet de sciage
scissors	ciseaux
scoop shovel	pelle creuse
scraper	grattoir
screwdriver	tournevis
seam roller	rouleau à joints
shears (guillotine)	cisailles-guillotines
shovel	pelle
slate hammer	marteau à ardoise
slate punch	poinçon d’ardoisier
slate ripper	tire-clou pour couverture en ardoise
sliding T-bevel	fausse équerre
staple gun	pistolet à agrafer
striker	allumeur
spade	bêche
sponges	éponges
spud bar	grattoir de démolition
squeegee	raclette
t-square	équerre en T
thermometer	thermomètre
tile nippers	pinces de nivelage pour tuiles
tin/metal snips	cisailles de ferblantier
trowel	truelle
utility knives (hooked and straight blades)	couteaux (à crochet et à lame droite)
wheelbarrow	brouette
wrench	clé de serrage

Power Tools, Pneumatic Tools, and Hot Air Welding, Induction, Fuelled Equipment / Outils électriques et pneumatiques, et équipement de soudage à l'air chaud, d'induction et alimentés

air compressor	compresseur d'air
backpack blower	souffleur à dos
dual-cartridge adhesive applicator	applicateur d'adhésif à cartouche double
drones	drones
electric drill	perceuse pneumatique
generator	génératrice
hammer drill	marteau-perforateur
hot air gun	pistolet à air chaud
hot air welder	soudeuse à air chaud
hot wires	fils chauds
induction welding equipment	équipement de soudage par induction
industrial vacuum	aspirateur industriel
moisture probes	humidimètre
nibbler	cisailles à tôle électrique (grignoteuse)
pneumatic caulking gun	pistolet à calfeutrer pneumatique
pneumatic nailers	cloueuses pneumatiques
pneumatic spray gun	pulvérisateur pneumatique
portable recording devices	enregistreur portatif
power mixer	malaxeur motorisé
power nailers	cloueuses électriques
power saws (chain, concrete, quick-cut, reciprocating, circular)	scies (à chaîne, à béton, à coupe rapide, alternative, circulaire)
power seamer	sertisseuse
power spudder	scarifieuse
powder-actuated equipment	équipement à charge explosive
pressure washer	appareil de lavage sous-pression
primer machine	pulvérisateur
propane tank	réservoir à propane
pump	pompe
roll carrier	porte-rouleau
roller	rouleau
scanners	scanneurs
screw gun	pistolet à vis
spray gun and nozzle	pistolet à pulvériser et ajutage
thermal scanning equipment	équipement de balayage thermique
tile cutter	coupe-tuiles
torch	chalumeau
unishear	cisailles Unishear
water extractor	extracteur d'eau
welders	soudeuses

Hoisting, Lifting and Rigging Equipment / Équipement de hissage, de levage et de gréage

A-frame hoist	appareil de levage en A
bottle cages	porte-bouteilles
conveyor	convoyeur
crane	grue
gravel bucket	seau à gravier
gravel hopper	trémie à gravier
hand hoist	palan à main
hydraulic hoist	palan hydraulique
ladder	échelle
ladder hoist	palan à échelle
ladder jack	support d'échafaudage sur échelle
ladder pulley	poulie d'échelle
lifting fork	griffe
mechanical hoist	palan mécanique
monorail hoist	monorail
rigging (straps, slings, chains, shackles, carabiners, hooks, spreader bars, ropes, tag lines)	monte-charge (sangles, élingues, chaînes, manilles, mousquetons, crochets, barres d'écartement, câbles, câbles stabilisateurs)
swing hoist	palan à bascule
telehandler	appareil de manutention télescopique

Access Equipment / Équipement d'accès

aerial work platforms	plateformes de travail élévatrices
ladders (extension, fixed, step, fabricated)	échelles (à coulisse, fixes, escabeaux, fabriquées)
scaffolds	échafaudages
swing stage	échafaudage suspendu
roof brackets	étriers à toiture

Hot Process Equipment / Équipement pour procédé à chaud

agitator kettle	fondoir agitateur
asphalt spreader	épandeur d'asphalte
automated seamer	soudeuse automatique à air chaud
bitumen mop/skeins (fibreglass, cotton)	vadrouille à bitume (fibre de verre, coton)
bitumen pump and piping	pompe et tuyauterie à bitume
bitumen tanker	camion-bitumier
burner	chalumeau
dipper	louche
felt laying machine	machine à installer les feutres
granular embedder/degranulator	dégranuleur
hot tanker/carrier	chariot verseur d'asphalte
hot asphalt kettle	fondoir à goudron
mini mop	mini-épandeuse
melter	bouilloir
mop cart	chariot à vadrouille
pour pail	seau verseur
squeegee	raclette
truck tanker	camion-bitumier
wheeled asphalt bucket	seau à asphalte sur roue

Motorized Equipment / Équipement motorisé

chainsaw	scie à chaîne
forklift	chariot élévateur à fourche
mechanical broom	balai mécanique
mechanical scraper	gratte mécanique
mechanical spudder	scarifieuse mécanique
personnel lift	monte-personne
power broom	balai à moteur
power buggy	chariot motorisé
power gravel spreader	épandeuse à gravier
power insulation carrier	transporteur d'isolant motorisé
power scraper	grattoir mécanique
power spreader	épandeur mécanique
roof cutter	couteau de couverture
roof cutting machine	machine à couper la couverture
roof dryer	séchoir à toiture
skid steer loader	chargeuse à direction à glissement
snow blower	souffleuse à neige
tear-off machine	machine à arracher les matériaux
handler forklift	chariot télescopique

Disposal Equipment / Équipement de mise au rebut

carts	chariots
disposal bin	conteneur à déchets
disposal chute	chute à déchets
garbage bags	sacs à déchets
garbage tray	bac à déchets
hoppers	trémies
trucks and trailers	camions et remorques
wheelbarrow	brouette

APPENDIX C
GLOSSARY/GLOSSAIRE

This glossary was provided and used with permission by the Canadian Roofing Contractors Association.

A-frame	a portable frame built in the shape of a letter “A” and used by roofers to hoist materials.	**Chevalet**	Un cadre portable construit en forme de lettre « A » et utilisé par les couvreurs pour lever des matériaux.
Adhere	to cause two surfaces to be held together by the combined strength of the molecular forces and the mechanical interlocking achieved between adhesive and the bonded surface. See adhesion.	**Coller**	faire tenir deux surfaces ensemble par la force combinée des forces moléculaires et de l’enchevêtrement mécanique obtenu entre l’adhésif et la surface liaisonnée. Voir adhérence.
Adhesion	1. The degree of attachment between two surfaces held together by interfacial forces – mechanical or chemical or both: 2. the degrees of attachment or bonding between application of the same substance. 3. the combined ultimate strength of the molecular forces and the mechanical interlocking achieved between the adhesive and the surface bonded. Adhesion is measured in shear and peel modes.	**Adhérence**	1. Le degré de fixation entre deux surfaces maintenues ensemble par des forces interfaciales - mécaniques ou chimiques, ou les deux: 2. les degrés de fixation ou de liaison entre l'application de la même substance. 3. la résistance ultime combinée des forces moléculaires et de l’emboîtement mécanique obtenu entre l'adhésif et la surface collée. L'adhérence se mesure en cisaillement et au décollement.
Adhesive	A cementing substance that produces a steady and firm attachment or adhesion between two surfaces. Adhesion is measured in shear and peel modes.	**Adhésif**	substance produisant un liaisonnement ou une adhérence stable et ferme entre deux surfaces. L'adhérence se mesure en cisaillement et au décollement.
Aggregate	1. Crushed stone, crushed slag, or water-worn or natural gravel used as protective surfacing or ballast in a roof system. 2. Any granular mineral material. 3. Roofing gravel in built-up roofing (BUR).	**Granulat**	1. Pierre concassée, laitier concassé ou gravier naturel ou usé par l’eau, utilisé comme surfaçage protecteur ou comme lest sur une couverture. 2. Toute matière minérale granulaire. 3. Gravier de couverture dans les couvertures multicouches.
Aggregate, lightweight (LWA):	Aggregate of low density; examples include coal bottom ash, pumice, scoria, volcanic cinders, tuff and diatomite; expanded or sintered clay, shale, slate, diatomaceous shale, perlite, vermiculite or slag and bonded or sintered coal combustion products (CCPs) used to produce lightweight concrete or component products.	**Agrégat léger**	Granulat de faible densité tel que cendre de houille résiduelle, pierre ponce, scories, cendres volcaniques, tuf et diatomées ; argile expansée ou frittée, schiste argileux, ardoise, schiste diatomique, perlite, vermiculite ou laitier et produits de combustion du charbon liés ou frittés utilisés pour produire le béton léger ou les composants.

Air barrier	An assembly of materials or building element used in building construction that provides resistance to the movement of air into and out of the building.	**Pare-air**	Assemblage de matériaux ou d'éléments de construction utilisés dans la construction d'un bâtiment qui offre une résistance au mouvement de l'air à l'entrée et à la sortie du bâtiment.
Alligatoring	Hardening and shrinking of exposed bitumen coatings due to oxidation, that produces small islands of bitumen between deep cracks and gives the appearance of alligator hide.	**Crocodilage**	Durcissement et rétrécissement causés par l'oxydation des enduits bitumineux exposés, qui produisent de petits monticules de bitume entre des fissures profondes qui donnent l'aspect d'une peau de crocodile.
Aluminum	A non-rusting, malleable metal sometimes used for metal roofing and flashing.	**Aluminium**	Métal malléable et inoxydable parfois utilisé pour les couvertures et les solins métalliques.
Alloys, polymeric	A blend of two or more polymers, e.g. a rubber and a plastic, to improve properties such as impact strength.	**Alliages polymériques**	Mélanges de plusieurs polymères, un caoutchouc et un plastique par exemple, afin d'en améliorer les propriétés comme la résistance aux chocs.
Application	The act of putting on or building up the felts and flashings of all elements of any roofing system. The materials may be hot or cold fluids or adhesives or prefabricated sheets.	**Application**	Action de mettre en place ou de façonner les feutres et les solins de tous les éléments de n'importe quel type de couverture. Les matériaux peuvent être des liquides ou des adhésifs chauds ou froids, ou des feuilles préfabriquées.
Application temperature	The temperature of the hot materials such as asphalt when applied to the roof. See also equiviscous temperature (EVT).	**Température d'application**	Température d'une matière chaude, comme le bitume à son application sur la couverture. Voir aussi température d'équiviscosité (TEV).
Architectural shingle	An asphalt shingle that provides a dimensional appearance. See dimensional shingle.	**Bardeau de style architectural**	Un bardeau d'asphalte qui présente une apparence texturée. Voir bardeau dimensionnel.
Asbestos	A group of natural, fibrous impure silicate materials.	**Amiante**	Groupe de silicates naturels, impurs et fibreux.

Asphalt	A bituminous brown to black material derived from the distilling of crude oil, commonly left as a residue after evaporating or otherwise processing crude oil or petroleum. See bitumen. Asphalt may be further refined to provide a wide range of viscosities and softening points required for this end use e.g. shingles, BUR for different slopes etc. as per the following grade specifications: **Type 1 -** asphalt for use on built-up roofs with slopes less than or equal to 1:16 (6.25º) and for use as waterproofing below ground level when not exposed to surface temperatures above 25°C (77°F). **Type 2 -** asphalt for use on built-up roofs with slopes less than or equal to 1:8 (12.5º) and for use as waterproofing above ground level on vertical surfaces not exposed to direct sunlight. **Type 3** - asphalt for use on built-up roofs with slopes greater than 1:8 (12.5º) for exposed applications or for use as waterproofing above ground level on vertical surfaces not exposed to direct sunlight.	**Asphalte**	Matière bitumineuse brune à noire provenant de la distillation du pétrole brut, généralement laissée en tant que résidu après évaporation ou autre traitement du pétrole brut ou du pétrole. Voir bitume. L'asphalte peut être affiné pour fournir une large gamme de viscosités et de points de ramollissement requis pour cette utilisation finale, par exemple bardeaux, toitures multicouches pour différentes pentes, etc. selon les spécifications de qualité suivantes : **Type 1** - asphalte destiné à être utilisé sur les toitures construites dont la pente est inférieure ou égale à 1 sur 16 (6,25º) et à servir d'étanchéité sous le niveau du sol lorsqu'il n'est pas exposé à des températures supérieures à 25°C (77°F). **Type 2** - asphalte utilisé sur les couvertures multicouches avec pentes de moins de 1 sur 8 (12,5º) et utilisé comme imperméabilisant au-dessus du niveau du sol sur les surfaces verticales non exposées à la lumière directe du soleil. **Type 3 -** asphalte destiné à être utilisé sur les toitures multicouches ayant des pentes supérieures à 1:8 (12,5º) pour des applications exposées ou pour une utilisation comme étanchéité au-dessus du sol sur des surfaces verticales non exposées directement aux rayons solaires.
Asphalt emulsion	A mixture of asphalt particles and emulsifying agent, such as bentonite clay or soap, and water.	**Émulsion d'asphalte**	Solution aqueuse de particules de bitume et d'agent émulsifiant, comme l'argile bentonitique ou le savon.
Asphalt felt	An asphalt-saturated and/or asphalt-coated organic or inorganic felt. See also felt.	**Feutre bitumé**	Feutre organique ou inorganique saturé ou enduit de bitume. Voir aussi feutre.
Asphalt mastic	A mixture of asphaltic material and graded mineral aggregate that can be poured when heated, but requires mechanical manipulation to apply.	**Mastic d'asphalte**	Mélange de matière asphaltique et de granulats minéraux calibrés qui peut être coulé lorsqu'il est chauffé, mais dont l'application nécessite une manipulation mécanique.
Asphalt roof cement	A trowelable mixture of solvent-based bitumen, mineral stabilizers, other fibers and/or fillers.	**Ciment à couverture en asphalte**	Mélange pouvant être travaillé à la truelle et composé de bitume à base de solvant, de stabilisants minéraux, d'autres fibres et/ou de fillers.

Asphalt shingle	A shingle manufactured by coating a reinforcing material (paper felt or fibreglass mat) with an asphalt-based coating and having mineral granules on the side exposed to the weather. See shingle.	**Bardeau d'asphalte**	Un bardeau fabriqué en revêtant d'asphalte un matériau de renfort (feutre ou mat de fibre de verre) et en recouvrant de granulé minéral la face exposée aux intempéries. Voir bardeau.
Atactic polypropylene (APP)	High-molecular-weight polymer formed by the polymerization of propylene and characterized by random arrangement of the side methyl groups around the chain backbone.	**Polypropylène Atactique (APP)**	Polymère à poids moléculaire élevé formé par la polymérisation du propylène et caractérisé par une disposition aléatoire des groupes méthyles latéraux autour du squelette de la chaîne.
Attic	The cavity or open space above the ceiling and immediately under the roof deck of a building.	**Comble**	Cavité ou espace ouvert au-dessus du plafond et immédiatement sous le platelage du toit d'un bâtiment.
Bird Bath	Random, inconsequential amounts of residual water on a roof membrane.	**Flaque superficielle**	Quantités aléatoires et sans répercussions d'eau résiduelle sur une membrane de toiture.
Bitumen	A generic term applied to mixtures of predominantly hydrocarbons in viscous or solid form, derived from coal or petroleum. The roofing industry uses it to describe either coal tar pitch or asphalt and used as an adhesive and waterproofing agent.	**Bitume**	Terme générique désignant des mélanges composés en grande partie d'hydrocarbures sous forme visqueuse ou solide, dérivés de la houille ou du pétrole. Dans l'industrie des couvertures, désigne également le brai de houille et l'asphalte, qu'on utilise comme adhésif et agent imperméabilisant.
Bituminous emulsion	1. A suspension of minute globules of bituminous material in water of in an aqueous solution. 2. A suspension of minute globules of water or of an aqueous solution in a liquid bituminous material (invert emulsion).	**Émulsion bitumineuse**	1. Suspension de minuscules globules de produits bitumineux dans l'eau ou dans une solution aqueuse. Aussi appelée émulsion de bitume. 2. Suspension de minuscules globules d'eau ou d'une solution aqueuse dans un produit bitumineux liquide (émulsion inverse).
Blister	An enclosed raised spot or area containing gas or liquid that shows on the surface of prepared and built-up roofing. Small blisters confined to the surface are called weather blisters, rash blisters, pimpling or blueberries. The larger, more serious and usually more evident blisters are structural blisters. These blisters are spongy to the touch and may occur between any of the layers of roofing felt or between membrane and deck or insulation.	**Boursouflure**	Surélévation fermée contenant des gaz ou du liquide apparaissant à la surface d'une couverture de matériaux préfabriqués ou d'une couverture à étanchéité multicouche. Les petites boursouflures ne touchant que la surface sont dites superficielles ou sont appelées cloques. Par ailleurs, les boursouflures plus grandes, plus graves et généralement plus visibles sont des boursouflures structurales. Celles-ci sont spongieuses au toucher et peuvent se produire entre n'importe quelles épaisseurs de feutres ou entre la membrane et le platelage ou l'isolant.
Bonding adhesive	the adhesive required to adhere a single ply membrane to its substrate.	**Adhésif de liaison**	Adhésif requis pour coller une membrane à une seule couche à son support.

Boot	A bellows-type covering to exclude dust, dirt, moisture, etc, from a flexible joint. It is used for making a watertight joint around a roof penetration.	**Soufflet de protection**	Recouvrement de type soufflet empêchant la poussière, la saleté, l'humidité, etc. de pénétrer dans un joint souple. On s'en sert pour réaliser des joints étanches à l'eau autour des points de pénétration du toit.
Brace	A piece of wood or other material that holds anything tightly or supports it firmly; a prop.	**Attache**	Morceau de bois ou de tout autre matériau qui retient ou supporte solidement une chose; un appui.
Brooming	Embedding a ply by using a broom to smooth it out and ensure contact and adhesion with the underlying substrate.	**Balayage**	Opération qui consiste à lisser, à l'aide d'un balai, une épaisseur de membrane pour qu'elle soit bien en contact avec l'adhésif sous-jacent.
Built-up Roofing (BUR)	A continuous, semi-flexible membrane consisting of plies of saturated felts, coated felts, fabrics or mats assembled in place with alternate layers of bitumen, and surfaced with mineral aggregate, or coating for protection from solar radiation. May include modified bitumen membrane system of more than one ply.	**Couverture multicouche**	Membrane continue semi-flexible constituée de feutres saturés, de feutres surfacés, de toiles ou de mats assemblés sur place avec des couches intercalaires de bitume ; la membrane est recouverte d'un granulat minéral ou d'un enduit pour la protéger du rayonnement solaire. Peut comprendre des systèmes de membrane de bitume modifié de plus d'une couche.
Burner	An apparatus that emits flame used to heat a kettle or to dry off roofs.	**Brûleur**	Appareil dégageant une flamme pour chauffer un fondoir ou pour assécher un toit.
Butt Joint	A joint formed by adjacent, separate sections of material, such as where two neighbouring pieces of insulation abut.	**Joint abouté**	Un joint constitué de sections de matériau adjacentes et séparées, par exemple lorsque deux panneaux d'isolant adjacents sont étroitement rapprochés.
Butyl rubber	A synthetic rubber based on isobutylene and minor amount of isoprene.	**Caoutchouc butyle**	Caoutchouc synthétique à base d'isobutylène et d'une faible quantité d'isoprène.
Cap sheet	1. The top ply of a built-up roofing membrane acting as the finished surface of a roof. 2. Any mineral-surfaced or other coated felt or sheet designed to provide waterproofing and weatherability. 3. The finishing layer in a modified bitumen roof membrane system.	**Couche de finition**	1. Épaisseur supérieure d'une membrane multicouche agissant comme surface de finition de la couverture. 2. Tout feutre ou matériau en feuilles à enduit minéral ou autre conçu pour assurer l'étanchéité à l'eau et la résistance aux conditions atmosphériques. 3. La couche de finition d'un système de couverture à membrane de bitume modifié.
Caulking	Any of a wide range of bituminous, rubber, plastic or other materials suitable for filling seams or cracks to make them tight against water leakage and remain plastic for an extended time after application. See also sealant.	**Calfeutrage**	Matériaux très variés à base de bitume, de caoutchouc ou de plastique conçus pour remplir des joints et des fissures afin de les rendre étanches à l'eau; ces matériaux demeurent plastiques pendant une période prolongée après leur application. Voir aussi scellant.

Cement	A substance used to make objects adhere to each other. In the roofing industry loosely applied to mean caulking and mastic.	**Ciment**	Substance utilisée pour faire adhérer deux objets l'un à l'autre. Dans l'industrie des couvertures, on utilise ce terme pour désigner vaguement le calfeutrage et le mastic.
Chalk line	Heavy string or cord used for lining purposes.	**Cordeau à craie**	cordeau ou cordon lourd utilisé pour tracer des lignes à la craie.
Coal tar	Tar derived from the destructive distillation of coal during the conversion of coal into coke.	**Goudron de houille**	Goudron tiré de la distillation destructive du charbon pendant la conversion du charbon en coke.
Coal tar pitch	A bituminous material from the heavy end of the distillation of crude coal tar produced from the coking of coal.	**Brai de houille**	Un matériau bitumineux provenant de la fraction lourde de la distillation du goudron de houille brut produit par la cokéfaction du charbon.
Coated base sheet	1. An asphalt felt coated on one or both sides with harder, more viscous asphalt and surfaced with mineral matter of various sizes. 2. A glass fibre felt that has been simultaneously impregnated and coated with asphalt on both sides. These products come under the group of roll roofing.	**Feuille de base enduite**	1. Feutre bitumé enduit sur un seul ou sur les deux côtés d'un bitume plus dur et plus visqueux et surfacé avec des granulats minéraux de différentes grosseurs. 2. Feutre de fibre de verre qui a été simultanément imprégné et enduit de bitume des deux côtés. Ces produits font partie des matériaux de couverture en rouleaux.
Coating	A thin layer of a substance used to cover other materials, to provide an aesthetic or protective function.	**Enduit**	Mince couche d'une substance utilisée pour couvrir d'autres matériaux et ayant une fonction esthétique ou de protection.
Cold process roofing	A continuous, semi-flexible membrane consisting of plies of felts, mats, or fabrics laminated on a roof with alternate layers of roof cement and surfaced with a cold-applied coating.	**Couverture posée à froid**	Membrane continue semi-flexible constituée d'épaisseurs de feutres, de mats ou de tissus collés au toit avec des couches intercalaires de ciment à couverture et recouvertes d'un enduit appliqué à froid.
Collar	A metal cap flashing around a vent pipe projecting above a roof deck.	**Collerette**	Solin de couronnement métallique entourant un tuyau de ventilation faisant saillie au-dessus d'un platelage de toit.
Compatible materials	Two or more materials or substrates that can be mixed, blended or attached without separating, reacting or affecting the materials adversely.	**Matériaux compatibles**	Au moins deux matériaux ou supports qui peuvent être mélangés ou attachés sans se séparer, réagir ou affecter les matériaux.
Compound	An intimate admixture of a polymer with all the ingredients necessary for the properties required of the final product.	**Composé**	Mélange intime d'un polymère avec tous les ingrédients nécessaires pour obtenir les propriétés désirées du produit fini.
Condensation	The change from water vapour to liquid water, resulting from a drop in temperature of an air vapour mixture.	**Condensation**	La conversion de la vapeur d'eau en liquide à mesure que la température baisse.
Core sampling	A cylindrical sample taken from the roof.	**Carottage**	Prise d'échantillons cylindriques de toit.

Course	A continuous row or layer of shingles or other roofing materials.	**Rang**	Rangée ou couche continue de bardeaux ou d'autres matériaux de couverture.
Cover Board	Thin, normally homogeneous materials formed into boards and used over roof insulation to provide protection to the insulation during installation and service and to enhance the performance of the roofing assembly.	**Panneau de garnissage**	Panneau fait d'un matériau mince, normalement homogène, utilisé par-dessus l'isolant d'une couverture afin de protéger l'isolant pendant la pose et l'entretien et d'accroître le rendement de la toiture.
Coverage	1. The area to be covered per unit volume of coating to obtain a specified dry thickness. 2. Area covered by a unit of roofing such as a bundle of shingles of a roll of roofing.	**Étendue de recouvrement**	1. Surface à recouvrir par unité de volume d'un enduit de façon à obtenir l'épaisseur désirée à l'état sec. 2. Surface recouverte par une unité de matériau de couverture: un paquet de bardeaux ou un rouleau de matériau, etc.
Crack	A break in a roofing membrane as a result of flexing, often at a ridge or wrinkle.	**Fissure**	Rupture dans une membrane de couverture en raison des flexions ; se produit généralement aux arêtes et aux rides.
Cricket	A small false roof or an elevated part of the roof that is designed to channel surface water from behind an obstacle, such as a chimney, to drains. Frequently located in a valley, a cricket is often constructed like a small hip roof, or like a pyramid with a diamond shaped base. Also called a saddle.	**Dossier**	Petit faux toit ou une partie surélevée de la surface de la toiture, conçu pour détourner les eaux pouvant s'accumuler derrière un obstacle, comme une cheminée. Fréquemment situé dans une noue, un dossier ressemble souvent à un petit toit en croupe ou à une pyramide dont la base serait un losange. Aussi appelé dos d'âne.
Curb	A low wall of wood, masonry or metal built above the level of the roof, surrounding roof openings or supporting mechanical equipment.	**Muret**	Petit mur de bois, de maçonnerie ou de métal construit sur le dessus d'un toit, autour d'ouvertures dans le toit ou autour de matériel mécanique de soutien.
Cured	Completed dry; moisture free.	**Séché**	Complètement sec ; sans humidité.
Curing	To change the properties of a polymeric system into a more stable, usable condition by the use of heat, radiation, or reaction with chemical additives. See also cross linking and vulcanization.	**Cure**	Procédé destiné à changer les propriétés d'un produit polymérique pour le rendre plus stable et plus facile d'utilisation au moyen de chaleur, de rayonnement ou d'une réaction avec des adjuvants chimiques. Voir aussi réticulation et vulcanisation.
Dampproofing	The treatment of a building material or component surface with a bituminous or other coating to provide some measure of resistance to the passage of moisture into or through the material or components.	**Imperméabilisation contre l'humidité**	Traitement d'un matériau ou de la surface d'un élément de construction avec un enduit bitumineux ou autre pour éviter que l'humidité pénètre dans le matériau ou l'élément, ou le traverse.

Deck	The structural surface to which the roofing or waterproofing system is applied. See also Structural roof deck.	**Platelage**	Surface structurale sur laquelle la couverture ou le complexe d'imperméabilisation est appliqué. Voir aussi Platelage de toiture de charpente, et Pontage.
Deflection	1. The downward displacement of a structural member or system under load. 2. The change in mid-span position of a test specimen during a creep test.	**Flèche**	1. Le déplacement vers le bas d'un élément de la structure ou du système sous une charge. 2. Variation de la position à mi-portée d'une éprouvette lors d'un essai de fluage.
Delamination	1. Separation of components within a system as a result of cohesive or adhesive failure. 2. Separation of the laminated layers of a component or system.	**Décollement**	1. La séparation des éléments d'un système pour cause de rupture adhésive ou cohésive. 2. Séparation des épaisseurs de feutre d'une couverture multicouche ou séparation d'un joint.
Detail	One of the many minor parts into which a building may be divided; a drawing of such a part.	**Détail**	L'une des nombreuses parties secondaires dans lesquelles un bâtiment peut être divisé ; un dessin d'une telle partie.
Dipper	A ladle for pouring bitumen.	**Cuillère de coulée**	Godet servant à couler le bitume.
Drain	An outlet to allow water to flow from a surface into a drain pipe and away from the building through a drainage system.	**Avaloir**	Orifice prévu pour l'évacuation de l'eau de la surface d'un toit par un tuyau d'évacuation et un réseau d'égout.
Drip edge	The formed edge on metal flashing used at the eaves or other roof details to encourage water to drip away from vertical surfaces of the building detail.	**Larmier**	Bordure façonnée sur les solins métalliques des débords de toit et d'autres détails de couverture afin d'éviter que l'eau dégoutte sur les surfaces verticales.
Dunnage	Loose matting used to support and keep cargo in place.	**Fardage**	Matériaux non fixés servant à soutenir et protéger une cargaison.
Eave	The projecting lower edge of a roof. That part of a roof which projects beyond the wall.	**Avant-toit**	Rive inférieure en saillie d'un toit. La partie d'une couverture qui dépasse le mur.
Eaves flashing	The treatment of the edge of a roof with felt and metal flashing. The portion of the metal eaves flashing exposed on the elevation may be called a fascia flashing.	**Solin d'avant-toit**	Recouvrement du débord d'un toit avec du feutre et un solin métallique. La partie du solin de débord de toit métallique qui est apparente sur la façade peut être appelée solin de bordure de toit ou solin de fascia.
Elastomer	A macromolecular material that returns rapidly to its appropriate initial dimensions and shape, after substantial deformation by a low level of stress and the release of that stress.	**Élastomère**	Matériau macromoléculaire qui revient rapidement à sa forme et à ses dimensions initiales appropriées, après une déformation importante par un faible niveau de contrainte et la libération de cette contrainte.

Embedment or Embed	1. The process of pressing a felt, aggregate, fabric, mat or panel uniformly and completely into hot bitumen or adhesive to ensure intimate contact at all points. 2. The process of pressing granules into coating in the manufacture of factory-prepared roofing, such as shingles, roll roofing.	**Enrobage**	1. Enfoncer un feutre, du granulat, un tissu, un mat ou un panneau uniformément et complètement dans du bitume chaud ou de l'adhésif pour s'assurer que tous ses points sont bien en contact. 2. Enfoncer des granulés dans un enduit dans la fabrication des matériaux de couverture préfabriqués comme les bardeaux et rouleaux.
Emulsion	An intimate mixture of bitumen and water, with uniform dispersion of the bitumen or water gobules, usually stabilized by an emulsifying agent or system. When the water evaporates, the bitumen particles cement together.	**Émulsion**	Mélange intime de bitume et d'eau avec une dispersion uniforme des globules de bitume et d'eau, généralement stabilisé par un agent ou un complexe émulsifiant. Quand l'eau s'évapore, les particules de bitume se cimentent ensemble.
End lap	The amount of overlap at the start of a roll of felt over the end of the previously laid roll.	**Chevauchement des extrémités**	Longueur du chevauchement de l'extrémité de départ d'un rouleau de feutre sur l'extrémité du rouleau posé précédemment.
Envelope	1. The practice of carrying the air/vapour barrier or other waterproofing sheet up and onto the top surface of the insulation in a compact roofing system. 2. A continuous membrane edge seal formed at the perimeter and at penetrations by folding the base sheet or ply over the plies above and securing it to the tip of the membrane. The envelope prevents bitumen seepage from the edge of the membrane.	**Enveloppe**	1. La pratique qui consiste à prolonger le pare-air et le pare-vapeur ou une autre feuille d'étanchéité de façon à remonter jusqu'à la surface supérieure de l'isolant et à la recouvrir dans un système de couverture d'un seul tenant. 2. Joint de bordure continu réalisé sur le périmètre et autour des pénétrations en repliant la feuille de base au-dessus des épaisseurs supérieures et en la fixant sur le dessus de la membrane. L'enveloppe empêche le bitume de fuir par le bord de la membrane.
Equiviscous temperature (EVT)	The temperature at which bitumen will have the optimum viscosity for spreading at the required rate in roofing application.	**Température d'équiviscosité (TEV)**	Température à laquelle les bitumes auront la viscosité optimale pour l'épandage au taux requis lors de l'application.
Mop application	The temperature at which the asphalt's apparent viscosity is 0.125 Pa s (125 centipoise).	**Application à la vadrouille (ou au guipon)**	La température à laquelle la viscosité apparente de l'asphalte est de 0,125 Pa s (125 centipoises)
Equiviscous temperature (EVT) for asphalt	The recommended EVT for roofing asphalt as follows:	**Température d'équiviscosité (TEV) pour l'asphalte**	La TEV recommandée pour l'asphalte de toiture comme suit.
Ethylene Propylene Diene Monomer (EPDM)	A synthetic elastomer based on ethylene, propylene and a small amount of a non-conjugated diene monomer to provide for vulcanization.	**Ethylène Propylène Diène Monomère (EPDM)**	Élastomère synthétique obtenu à partir d'éthylène, de propylène et d'une petite quantité de monomère diénique non conjugué (placé sur une chaîne latérale) pour permettre sa vulcanisation.

Expanded polystyrene (EPS)	Insulation composed principally of polystyrene resin processed to form a rigid foam having a predominantly closed-cell structure. Boards or blocks are formed during expansion. See also insulation.	**Polystyrène expansé**	Isolant principalement composé de résine de polystyrène traitée pour former une mousse rigide dont la structure est essentiellement cellulaire. Des panneaux et des blocs sont formés lors de l'expansion. Voir aussi isolant.
Exposure	1.The time during which a portion of a roofing element is exposed to any environment; natural or laboratory created. 2. The transverse dimension of a roofing element not overlapped by an adjacent element in any roofing system. The exposure of any ply in a membrane may be computed by dividing the felt width minus 50 mm, by the number of shingled plies; thus, the exposure of a 900 mm (36 in) wide felt in a shingled, four ply membrane should be (900-5)/4 = 213 mm (8.5 in).	**Exposition**	1. Laps de temps pendant lequel une partie d'un élément de couverture est exposée à un environnement naturel ou créé en laboratoire. 2. La dimension transversale d'un élément de toiture qui n'est pas chevauché par un autre élément adjacent du système. L'exposition d'une couche de la membrane peut être calculée en divisant la largeur du feutre moins 50 mm par le nombre de couches mises en bardeau; ainsi, l'exposition d'un feutre d'une largeur de 900 mm (36 po) dans une membrane de quatre couches mise en bardeau devrait être (900-5)/4 = 213 mm (8,5 po).
Extruded polystyrene (XPS)	Insulation board produced by a continuous extrusion process as the resin foams. This forms a tight and complete skin on each side of the board.	**Polystyrène extrudé**	Isolant en panneaux produit par un procédé d'extrusion en continu à mesure que la résine mousse. On obtient ainsi une peau étanche et complète de chaque côté du panneau.
Fabric	1. Geotextile membranes used as a protective or separating layer in roofing and waterproofing systems. 2. A woven cloth of organic or inorganic filaments treated with bitumen and being stronger than felt, used in special flashing applications.	**Toile**	1. Membranes géotextiles servant de couche protectrice ou de séparation dans les systèmes de couverture et d'imperméabilisation. 2. Tissu de filaments organiques ou inorganiques traité avec du bitume et utilisé pour les solins spéciaux en raison de sa résistance supérieure à celle du feutre.
Fall arrest system	an assembly of components joined together so that when the assembly is connected to a fixed support, it is capable of arresting a worker's fall.	**Système d'interruption de chute**	Ensemble d'éléments réunis pour que, lorsque l'ensemble est relié à un support fixe, il soit capable d'arrêter la chute d'un travailleur.
Fascia	Any cover board at the edge or eaves of a flat or sloping overhanging roof.	**Bordure de toit (ou fascia)**	Toute planche de façade sur les bords ou les avant-toits d'une toiture avec ou sans pente.
Felt	A general term used to describe sheet roofing material consisting of a mat of organic or inorganic fibres untreated, saturated, impregnated or saturated and coated with bitumen and supplied in roll form.	**Feutre**	Terme général servant à décrire des matériaux de couverture en feuilles constitués d'un mat de fibres organiques ou inorganiques non traité ou saturé, ou encore saturé et enduit de bitume, généralement vendus en rouleaux.

Filler	1. Finely-divided mineral matter used as an extender to improve the properties of asphalt coatings for shingle and built-up roofing felts, and bituminous plastic cement or mastic. 2. Different types of fillers are used in some polymeric materials to improve some mechanical properties and also to reduce the cost of the finished product. See also stabilizer.	**Filler**	1. Matière minérale finement divisée et utilisée comme charge pour améliorer les propriétés des enduits bitumineux pour les bardeaux et pour les feutres de couverture multicouche ainsi que les ciments plastiques et mastics bitumineux. Synonyme de matière de remplissage et de charge. 2. Différents types de fillers sont utilisés dans certains matériaux polymériques pour améliorer certaines caractéristiques mécaniques et pour réduire le coût du produit fini. Voir aussi stabilisants.
Filter fabric	a woven inorganic cloth or geotextile used as a filter that allows passage of water while preventing passage or migration of fines particles and soil in a protected membrane or vegetated roof system.	**Tissu filtrant**	Toile inorganique tissée ou géotextile utilisés comme filtre permettant le passage de l'eau tout en prévenant le passage ou la migration de fines particules et du sol dans une membrane protégée ou un système de couverture végétalisé.
Flashing	A continuation of the roofing proper to cover any element of the roof structure departing from the roof deck incline.	**Solin**	Prolongement de la couverture principale qui recouvre les éléments du support de couverture qui font saillie par rapport à la pente du platelage du toit.
Flash off	The time required for the volatiles in a petroleum-based adhesive/primer to escape into the atmosphere prior to bonding.	**Temps de séchage**	Temps nécessaire pour que les solvants volatils d'un adhésif ou d'un apprêt à base de pétrole s'échappent dans l'atmosphère avant de coller.
Fluid-applied elastomer	An elastomeric material, which is fluid at ambient temperature and that dries or cures after application to form a continuous membrane for roofing and waterproofing.	**Élastomère à application fluide**	Matériau élastomérique fluide à la température ambiante et qui sèche ou durcit après application et forme une membrane continue pour couverture ou imperméabilisation.
Gauge	A metal thickness measurement.	**Épaisseur de feuille (calibre)**	Mesure de l'épaisseur d'un métal.
Granules	Particles of a graded size that are embedded in the asphalt coating of shingles, mineral-surfaced roofing, and modified bituminous membranes. These granules are opaque, natural, ceramically-coloured aggregates or crushed slags. The slag granules have a glassy or glittery appearance.	**Granulés**	Particules d'une grosseur calibrée qui sont noyées dans l'enduit bitumineux des bardeaux et des matériaux de couverture à surfaçage minéral. Ces granulés sont du laitier concassé ou des granulats opaques, naturels et aux couleurs céramiques. Les granulés de laitier ont un aspect vitreux ou étincelant.
Gravel	Small pieces of aggregate larger than sand grains resulting from the natural erosion or the crushing of rock, used to protect bituminous surfaces or ballast in roofing systems	**Gravier**	Petits granulats plus gros que des grains de sable provenant de l'érosion naturelle ou du concassage de pierres ; utilisé pour protéger les surfaces bitumineuses et comme lest sur les couvertures

Gravel spreader	A piece of mobile mechanical roofing equipment that dispenses and spreads gravel in one continuous operation.	**Épandeuse de gravier**	Machine mobile qui applique du bitume et épand du gravier en une seule opération continue.
Growing medium	an engineered blend of organic and inorganic materials specifically designed for the growth of plants in a vegetative roof system.	**Milieu de culture**	Mélange fabriqué de matériaux organiques et inorganiques spécialement conçu pour la croissance des plantes dans un système de toiture végétalisé.
Guardrail system	an assembly of components joined together to provide a barrier to prevent a worker from falling from the edge of a surface.	**Garde-corps**	Ensemble d'éléments réunis pour constituer un obstacle qui empêche un travailleur de tomber du bord d'une surface.
Gutter	Trough at the eaves of a roof to convey rain water from the roof to a downspout	**Gouttière**	Canal posé sur le débord de toit pour acheminer l'eau de pluie du toit au tuyau de descente.
Hip	The sloping line along the outer angle formed by the meeting of two sloping sides of a roof whose eaves meet at a right-angle. A hip roof is one that rises by inclined planes from all four sides of a building to form hips at the intersection of adjacent roof slopes.	**Arête**	Ligne inclinée le long de l'angle extérieur formé par l'intersection de deux versants d'un toit dont les débords de toit se rencontrent à angle droit. Un toit en croupe est un toit dont les quatre côtés sont en pente et se rencontrent pour former des arêtes.
Hoist	A hoisting machine, to pullup.	**Monte-charge**	Machine servant à hisser les matériaux sur le toit.
Hydrostatic pressure	The pressure equivalent to that exerted on a surface by a column of water of a given height.	**Pression hydrostatique**	Pression équivalente à celle qui s'exerce sur une surface par une colonne d'eau d'une hauteur donnée.
Ice dam	A mass of ice formed at the transition from a warm to a cold roof surface. Frequently formed by re-freezing meltwater at the overhang of a sloping roof, an ice dam may cause ice and water to back up and make the surface slippery for snow to slide down.	**Digue de glace**	Accumulation de glace à la jonction d'une surface chaude et d'une surface froide d'un toit. Des digues de glace se forment fréquemment sur le débord de toit en raison du regel de l'eau de fonte ; ils causent un refoulement de l'eau et de la glace, ce qui rend la surface glissante et entraîne le glissement de la neige.
Incline	The angle made by a roof plane with a horizontal plane. Interchangeable with slow, fall, or pitch.	**Inclinaison**	Angle formé par un toit par rapport à l'horizontale. Même chose que plan incliné, inclinaison, chute d'un toit.
Inorganic	Being or composed of matter other than hydrocarbons and their derivatives, or matter that is not of plant or animal origin.	**Inorganique**	Qualifie les matières ou les produits composés de matières autres que les hydrocarbures et leurs dérivés ; désigne aussi les matières qui ne sont pas d'origine végétale ou animale.

Insulation	A material used as part of a building enclosure to retard the flow of heat through the enclosure. It is made from a variety of organic and inorganic fibres and foams, e.g., expanded/extruded polystyrene, glass fibre, cellular glass, phenolic foam, perlite, polyurethane foam, polyisocynurate foam. It can be loose-filled, or used in batt, board or block form. See also roof insulation, board insulation.	**Isolant**	Matériau utilisé dans une enveloppe de bâtiment afin de limiter l'écoulement de chaleur à travers l'enveloppe. Les isolants sont fabriqués à partir d'une grande variété de fibres et de mousses organiques et inorganiques ; polystyrène extrudé et expansé, fibre de verre, verre cellulaire, mousse phénolique, perlite, mousse de polyuréthane, mousse de polyisocyanurate, etc. Ils peuvent être injectés en vrac ou utilisés en nattes, panneaux ou blocs. Voir aussi isolant de couverture et isolant en panneaux.
Jack	A flanged metal sleeve used as part of the flashing around small items that penetrate a roof.	**Manchette d'étanchéité**	Manchon d'étanchéité à bride utilisé comme solin autour des petits éléments traversant un toit.
Joist	One of a number of smaller closely-spaced parallel structural supports for a flat roof deck spanning between walls, roof beams, or purlins, or to support a flat ceiling below a sloping roof.	**Solive**	Appui structurel parallèle plus petit et peu espacé pour un platelage de toit plat recouvrant entre les murs, les poutres de toit ou les pannes, ou pour soutenir un plafond plat en dessous d'un toit en pente.
Kettle	Equipment used for heating bitumen to the temperatures required for application.	**Fondoir**	Appareil utilisé pour chauffer le bitume aux températures requises pour l'épandage.
Lap	That part of a roofing unit that covers the preceding course in any overlapping roofing application. Applied to shingles, built-up roofing felts, and most other types of roofing. See also exposure.	**Recouvrement**	Partie d'un élément de couverture qui recouvre la rangée précédente ; s'applique à tout matériau de couverture avec chevauchement ; bardeaux, feutres de membrane multicouche et la plupart des autres types de couvertures. Voir exposition.
Loose-laid membrane	A roofing membrane that is attached to the substrate only at the edges and roof penetrations and is ballasted.	**Membrane installée en indépendance**	Membrane de couverture qui n'est fixée au support que par les bords et aux points de pénétration, et qui est lestée.
Mastic	1. A material of relatively viscous consistency that dries or cures to form a protective finish, suitable for application to thermal insulation in thickness greater than 0.75 mm per coat. 2. Trowelable bituminous paste made by adding mineral fillers to concentrated cutbacks. See also plastic cement, cement and asphalt mastic.	**Mastic**	: 1. Matériau de consistance relativement visqueuse qui sèche ou durcit pour former un fini protecteur ; peut être appliqué à de l'isolant thermique en épaisseurs supérieures à 0,75 mm par couche. 2. Pâte bitumineuse applicable à la truelle obtenue par l'ajout de charges minérales à des bitumes fluxés concentrés. Voir aussi ciment plastique, ciment à solins et mastic d'asphalte.
Membrane	A continuous sheet of material whether it is prefabricated as a flexible polymeric sheeting or is sprayed or coated in the field, in single ply or in multiple plies.	**Membrane**	Un recouvrement continu de matériau, qu'il soit préfabriqué, comme un revêtement polymérique souple, ou qu'il soit pulvérisé ou épandu sur le chantier en une seule ou en plusieurs épaisseurs.

Membrane flashing	The vertical extension of the roofing membrane installed at horizontal to vertical junctions at roof penetrations and membrane terminations	**Solin membrané**	Prolongement vertical de la membrane de couverture installée aux points de pénétration horizontaux ou verticaux et aux extrémités de la membrane.
Metal flashing	Frequently used as through-the-wall, cap or counter-flashing.	**Solin métallique**	Type de solin souvent utilisé comme solin traversant le mur, solin de couronnement ou contre-solin.
Mini mopper	A small container with wheels that can be pushed along over the roof to dispense bitumen for the laying of roofing felts.	**Seau à vadrouille**	Petit contenant sur roues qu'on peut pousser sur un toit pour épandre du bitume pour la pose des feutres de couverture.
Mop	A tool used for the application of hot bitumen made from a bundle of cotton or other yarn attached to a long wooden handle. Bitumen soaked up and held by it when dipped into a container of hot material is transferred to and spread on the roof.	**Vadrouille (ou guipon)**	Outil servant à l'épandage du bitume chaud et constitué d'un tampon de cordages en coton ou d'autres matériaux et d'un long manche de bois. On la trempe dans un contenant de bitume chaud pour épandre le bitume sur le toit.
Organic	Being or composed of hydrocarbons or their derivatives, or matter of plant or animal origin.	**Organique**	Qualifie les hydrocarbures, leurs dérivés et leurs composés ainsi que les matières d'origine végétale ou animale.
Organic felt	Felt made from organic fibres and in particular wood fibres	**Feutre organique**	Feutre fait de fibres organiques et, en particulier, de fibres de bois.
Overhang	The part of a roof structure that extends beyond the exterior walls of a building.	**Débord de toit**	Partie d'une structure de toit qui fait saillie au-delà des murs extérieurs du bâtiment.
Overheating	Heating the material in the kettle in such a manner that its characteristics are altered. This alteration could occur by prolonged heating at proper temperature or by heating for shorter periods at higher than recommended kettle temperature.	**Surchauffe**	Chauffage excessif du matériau dans le fondoir, causant une modification de ses propriétés. La surchauffe peut résulter d'une chauffe prolongée à une température adéquate ou d'une chauffe de courte durée, mais à température trop élevée.
Parapet	The part of a perimeter wall that extends above the roof.	**Parapet**	Partie d'un mur de périmètre qui se prolonge au-dessus de la couverture.
Penetration	A measure of the hardness related to viscosity of bitumen as determined by an empirical test that gives the depth of penetration of a standard weighted needle vertically into a sample after a definite time and at a particular temperature. It is measured as the distance of penetration in tenths of a millimetre. A cone is sometimes used for special purposes instead of a needle.	**Pénétration**	Mesure de la dureté reliée à la viscosité du bitume, déterminée par un essai empirique qui donne la profondeur de pénétration d'une aiguille standard lestée s'enfonçant verticalement dans une éprouvette en un temps et à une température donnés. La distance de pénétration est mesurée en dixièmes de millimètre. Un cône est parfois utilisé au lieu de l'aiguille dans des cas particuliers.

Perlite	1. It is produced by heating and expanding silicaceous volcanic glass and is used as loose fill insulation. 2. It is also used as an aggregate in light-weight concrete. 3. It is combined with organic fibres and waterproofing binders to make insulating boards.	**Perlite**	1. Matériau produit par chauffage et expansion du verre volcanique siliceux et utilisé comme isolant en vrac. 2. Est également utilisé comme granulat dans le béton léger. 3. On le combine à des fibres organiques et à des liants imperméabilisants pour faire des panneaux d'isolant.
Photovoltaic panel	a number of modules that are electrically and mechanically connected and provides a field-installable unit.	**Panneau photovoltaïque**	Un certain nombre de modules branchés électriquement et mécaniquement qui permettent l'installation d'une unité sur le chantier.
Pitch	A black or dark brown solid cementious residue that results from the distillation of tar. A tar derived from coal is referred to as coal tar, and a pitch derived from coal tar as coal tar	**Brai**	Résidu cimentaire solide, noir ou brun foncé, provenant de la distillation du goudron. Un goudron tiré de la houille est appelé goudron de houille et un brai tiré de ce goudron est appelé brai de houille. Aussi appelé brai de couvreur.
Plastic cement	Although all caulking cements could be called plastic cements, there is a commonly held acceptance in the roofing industry that plastic cement means bituminous cement, either asphalt or coal tar based. It is a mixture of bitumen, asbestos fibres, filler and suitable solvent. See also flashing cement.	**Ciment plastique**	Tous les ciments de calfeutrage pourraient être appelés ciments plastiques, mais il est généralement reconnu dans l'industrie de la toiture que le ciment plastique est un ciment bitumineux, à base de bitume ou de goudron de houille. Il s'agit d'un mélange d'asphalte, de fibres d'amiante, de filler et d'un solvant approprié. Voir aussi ciment à solins.
Ply	A single layer or thickness of roofing material in a roofing membrane. A four-ply membrane has at least four plies of felt at any vertical cross section cut through the membrane.	**Épaisseur (ou couche)**	Une seule épaisseur de matériau dans une membrane de couverture. Une membrane quatre épaisseurs comporte au moins quatre épaisseurs de feutre à toute section verticale découpée dans la membrane.
Polyisocyanurate foam	This insulation material is produced from polyisocyanurate based chemicals. The foam board is sandwiched between asphalt saturated organic or inorganic felt facer sheets.	**Mousse de polyisocyanurate**	Ce matériau isolant est fabriqué à partir de produits à base de polyisocyanurate. La mousse isolante est recouverte des deux côtés de feuilles de feutre organique ou inorganique saturées de bitume.
Polymer	A macromolecular material formed by the chemical combination of monomers having either the same or different chemical composition. Plastics, rubbers, and textile fibres are all high molecular weight polymers.	**Polymère**	Matériau macromoléculaire formé par la combinaison chimique de monomères de composition chimique semblable ou dissemblable. Les plastiques, les caoutchoucs et les fibres textiles sont tous des polymères à poids moléculaire élevé.
Polypropylene	A tough, lightweight rigid plastic made by the polymerization of high-purity propylene gas.	**Polypropylène**	Plastique rigide, résistant et léger obtenu par polymérisation de gaz propylène de pureté élevée.

Polyurethane (PU):	Insulation composed principally of the catalysed reaction product of polyisocyanurate and polyhydroxy compounds, processes usually with fluorocarbon gas to form a rigid foam having a predominantly closed-cell structure. It is sprayed-in-place or preformed into boards. See also insulation.	**Polyuréthane (PU)**	Matériau isolant composé principalement du produit de réaction catalysé du polyisocyanate et de composés polyhydroxylés ; généralement traité avec du fluorocarbure gazeux pour former une mousse rigide de structure principalement cellulaire. Il est mis en œuvre par injection ou en panneaux préfabriqués. Voir aussi isolant.
Polyvinyl Chloride (PVC)	A synthetic thermoplastic polymer prepared from vinyl chloride. PVC can be compounded into flexible and rigid forms through the use of plasticizers, stabilizers, filler, and other modifiers. The rigid forms are used in pipes, the flexible forms in the manufacture of sheeting for roofing.	**Chlorure de polyvinyle (PCV)**	Polymère thermoplastique synthétique fait à partir de chlorure de vinyle. Le PCV peut être transformé en matériaux flexibles et rigides par l'ajout de plastifiants, de stabilisants, de filler et d'autres adjuvants. Sous forme rigide, on s'en sert pour les tuyaux ; sous forme flexible, on s'en sert dans la fabrication des revêtements de couverture.
Positive drainage	The drainage condition in which consideration has been made during design for all loading deflections of the deck and additional roof slope has been provided to ensure drainage of the roof area within 48 hours following rainfall during conditions conducive to drying.	**Drainage dirigé**	Type de drainage pour lequel on a tenu compte pendant la conception de toutes les déformations provenant des charges imposées au platelage, en prévoyant sur la couverture une pente supplémentaire afin de permettre l'évacuation de l'eau en moins de 48 heures après la tombée de la pluie, dans des conditions favorables au séchage.
Pourable sealer	A type of sealant often supplied in two parts and used at difficult-to-flash penetrations, typically in conjunction with pitch-pockets to form a seal.	**Produit d'étanchéité versable**	Type de produit d'étanchéité souvent fourni en deux parties et utilisé autour des pénétrations qu'il est difficile de munir de solins, normalement utilisé de concert avec les manchons pour pénétrations.
Pour coat	The top layer of bitumen for an aggregate-surfaced built-up roofing membrane, poured or flooded onto the finished felts and over which the aggregate is spread. Also called a pour or a flood coat.	**Couche d'étanchéité**	Couche supérieure de bitume d'une membrane multicouche à surface de granulat coulée sur les feutres finis et sur laquelle le granulat est épandu. Aussi appelée couche de surface.
Primer	A thin liquid bitumen applied to a surface to improve the adhesion of heavier applications of bitumen and to absorb dust. The most commonly used is asphalt primer.	**Apprêt**	Bitume liquide clair appliqué sur une surface pour améliorer l'adhérence des couches de bitume plus lourdes et pour absorber la poussière. Le plus courant est l'apprêt d'asphalte.
Purlin	A horizontal structural member spanning between beams, frames or trusses to support a roof deck or the rafters or joists supporting a roof deck.	**Panne**	Élément structural horizontal recouvrant l'espace entre des poutres, des charpentes ou des fermes pour soutenir un platelage de toit ou les chevrons ou solives soutenant un platelage de toit.

Rafter	One of a number of closely spaced structural members of a sloped roof, usually extending from the eaves to a ridge or hip on a small roof or between purlins on larger roofs to carry the roof deck.	**Chevron**	Un certain nombre d'éléments structuraux très espacés d'un toit en pente, qui se prolongent habituellement à partir des débords de toit jusqu'à un faîte ou à une arête sur un petit toit ou entre des pannes sur de plus grands toits.
Rake	The sloped edge of a roof at the first or last rafter, i.e. at its intersection with a gable.	**Rive latérale**	Bord incliné d'un toit au premier ou au dernier chevron, c.-à-d. à son intersection avec un pignon.
Re-covering	The process of covering an existing roofing system with a new roofing system.	**Resurfaçage**	Consiste à recouvrir une couverture existante d'un nouveau système de couverture.
Reinforcement	A strong inert material bound into asphaltic or polymeric materials to improve its strength, stiffness, and impact resistance. Reinforcements are usually long fibres of glass, sisal, cotton or polymers, in woven or non-woven form. To be effective, the reinforcing material must form a strong adhesive bond with the resin.	**Armature**	Matériau inerte résistant incorporé aux matériaux bitumineux ou polymériques pour augmenter leur résistance, leur rigidité et leur résistance aux chocs. Les armatures sont généralement de longues fibres de verre, de sisal, de coton ou de polymères, tissées ou non tissées. Pour être efficace, l'armature doit avoir une bonne adhérence avec la résine.
Re-roofing	Replacement of all or part of a roofing system.	**Remplacement de couverture**	Consiste à remplacer tous les éléments du système de couverture en place.
Ridge	The horizontal line where two opposite sloping sides of a roof join at the highest level of the roof.	**Faîte**	Ligne horizontale où se rejoignent des versants opposés d'un toit au sommet de ce dernier.
Ridge cap	The covering of wood, metal or other roofing material that tops the ridge of a roof.	**Couronnement de faîte**	Le recouvrement de bois, de métal ou d'un autre matériau de couverture qui couronne le faîte d'un toit.
Roll roofing	Any roofing material that is supplied from the manufacturers in rolls, but more specifically applied to coated felts either smooth or mineral-surfaced used for roofing without additional top coatings or surfacing.	**Matériaux de couverture en rouleaux**	Tout matériau de couverture fourni en rouleaux par le fabricant ; désigne plus particulièrement les feutres enduits à surface lisse ou à surfaçage minéral utilisés pour les couvertures sans autres enduits ni surfaçages.
Roof	**:** a construction on top of a building that together with walls forms a separator between inside and outside environments. A roof system is a structurally supported, air, heat, interior moisture and rain control combination**.**	**Toit**	: Construction par dessus un bâtiment qui, avec les murs, forme une séparation entre l'intérieur et l'extérieur. Un système de couverture est une combinaison soutenue par la structure pour contrôler l'air, la chaleur, l'humidité intérieure et la pluie**.**
Roof assembly	An assembly of interacting roof components (including structural roof deck) for weatherproofing and thermal insulation.	**Complexe de couverture**	Ensemble d'éléments interactifs conçus pour imperméabiliser, et généralement isoler, la surface supérieure d'un bâtiment.
Roof covering	The exterior roof cover or skin of the roof assembly, consisting of membrane, panels, sheets, shingles, tiles, etc.	**Couverture**	La couverture de toit extérieure, composée de membrane, de panneaux, de feuilles, de bardeaux, de carreaux et autres.

Roofing	1. The material used for constructing a water shedding or waterproofing system. 2. That part of the architectural specifications and building construction contract that deals with the supply and application of roofing materials and systems.	**Matériaux de couverture**	1. Le matériel utilisé pour construire un complexe d'imperméabilisation ou d'étanchéité. 2. En-tête du devis d'architecture et du contrat de construction qui porte sur la fourniture et sur la pose des matériaux et complexes de couverture.
Roofing system	An assembly of interacting components designed to weatherproof, and normally to insulate, a building's top surface.	**Toiture (ou couverture)**	Ensemble des éléments de toiture (y compris le platelage structural) assurant l'imperméabilisation et l'isolation thermique; la surface supérieure d'un bâtiment.
Roof insulation	Any medium of low-density material suitable and used as part of a roofing system to reduce heat loss or gain through the roof. See also insulation, board insulation.	**Isolant de couverture**	Tout matériau de masse volumique moyenne à faible incorporé à un complexe de couverture pour réduire les pertes ou les apports de chaleur à travers le toit. Voir aussi isolant et isolant en panneaux.
Roof system	A system in interacting roof components (not including structural roof deck) for weatherproofing and thermal insulation.	**Système de couverture**	Un système dans les composants de toiture en interaction (non compris le platelage de toiture structurel) pour l'isolation contre les intempéries et l'isolation thermique.
Rubber	A polymeric material that, at room temperature, is capable of recovering substantially in shape and size after removal of a deforming force. Refers to both synthetic and natural rubber. Also called an elastomer.	**Caoutchouc**	Matériau polymérique qui, à la température ambiante, est capable de reprendre substantiellement sa forme et ses dimensions initiales après l'enlèvement d'une force qui le déformait. Désigne le caoutchouc naturel et synthétique. Aussi appelé élastomère.
Saddle	A ridge in a roof deck that divides two sloping parts of the surface so that water will be diverted to the roof drains. Usually constructed in a level valley, or behind a projection above a sloping roof. See cricket.	**Dos d'âne**	Sillon dans un platelage de toit qui divise deux parties de surface en pente pour que l'eau soit dirigée vers les avaloirs de toit. Construite habituellement dans une noue de niveau, ou derrière une projection au-dessus d'un toit en pente. Voir dossier.
Safety factor	The ratio of the failure load to the specified load or rated load.	**Coefficient de sécurité**	Rapport de la charge de rupture à la charge indiquée ou à la charge nominale.
Safety net	A safety net that is located and supported in such a way that it arrests the fall of a worker who may fall into it without endangering the worker.	**Filet de sécurité**	Filet placé et soutenu de façon à arrêter sans danger la chute d'un travailleur qui pourrait y tomber.
Screen	An apparatus with circular apertures or mesh for separating sizes of granular material, e.g. aggregates.	**Tamis**	Appareil à ouvertures circulaires ou à treillis servant à trier des matériaux granulaires de différentes grosseurs, comme le granulat.

Scupper	An outlet in the wall of a building or a parapet wall for drainage of overflow water from a floor or roof directly to the outside. Special scupper drains connected to internal drains are sometimes installed at roof and wall junctions.	**Gargouille**	Ouverture dans un mur ou dans un parapet pour évacuer le trop-plein d'eau d'un plancher ou d'un toit directement à l'extérieur. Des gargouilles spéciales reliées à des avaloirs intérieurs sont parfois installées à la jonction du toit et d'un mur.
Sealant	A mixture of polymers, fillers, and pigments used to fill and seal joints where moderate movement is expected; unlike caulking, it cures to a resilient solid. See also caulking.	**Mastic d'étanchéité**	Mélange de polymères, de fillers et de pigments servant à garnir et à sceller les joints soumis à des mouvements modérés ; contrairement au calfeutrage, il durcit pour former un solide résilient. Voir aussi calfeutrage.
Seam	A joint formed by mating two separate sections of material. Seams can be made or sealed in a variety of ways, including adhesive bonding, hot-air welding, solvent welding, using adhesive tape, sealant, etc.	**Joint à recouvrement**	Joint réalisé en assemblant deux parties de matériau séparées. Ces joints peuvent être réalisés ou étanchéisés de diverses façons, notamment par collage, soudage à l'air chaud, collage par solvant, au moyen d'une bande adhésive ou d'un produit d'étanchéité, etc.
Self-adhesive membrane	A membrane that can adhere to a substrate and to itself at overlaps without the use of an additional adhesive. The undersurface of a self-adhering membrane is protected by a release paper or film, which prevents the membrane from bonding to itself during shipping and handling.	**Membrane autoadhésive**	Membrane qui peut être collée à un support ou sur elle-même à l'endroit des recouvrements sans qu'il soit nécessaire d'utiliser un autre adhésif. La face inférieure d'une membrane autoadhésive est protégée par une pellicule ou un papier anti-adhérent qui empêche la membrane de coller sur elle-même pendant l'expédition et la manutention.
Self-sealing shingle	An asphalt shingle containing a factory-applied strip or spots of heat sensitive adhesive intended to adhere the overlying shingle once installed on the roof and warmed by the sun.	**Bardeau autoadhésif**	Bardeau d'asphalte sur lequel on a appliqué à l'usine une bande ou des pastilles d'adhésif sensible à la chaleur, servant à le coller au bardeau qui le recouvre en partie après sa pose sur la toiture, lorsqu'il est exposé à la chaleur du soleil.
Sheet	An unrolled piece of roofing felt or other single-ply prefabricated material.	**Feuille**	Morceau de feutre ou de tout autre matériau de couverture préfabriqué à une épaisseur non présenté en rouleau.
Shingle	1. A small unit of prepared roofing designed for installation with similar units in overlapping rows on inclines. 2. To cover with shingles. 3. To apply any sheet material in overlapping rows like shingles.	**Bardeau**	1. Petit élément à toiture préfabriqué destiné à être installé avec ses pairs par rangs à recouvrement sur des pentes. 2. Recouvrir de bardeaux. 3. Pose de n'importe quel matériau en feuilles en rangs superposés comme des bardeaux.

Shingling	1. The application of any roofing material by overlapping the units in horizontal courses with the overlapping down the slope to shed water. 2. The usual method of laying roofing felts in built-up roofing with overlapping sufficient to produce the number of plies desired.	**Bardage**	1. Pose de tout matériau de couverture par recouvrement des éléments en rangs horizontaux, le chevauchement étant réalisé vers le bas afin de permettre l'écoulement de l'eau. 2. Méthode de pose habituelle des feutres dans une couverture multicouche assurant un chevauchement suffisant pour obtenir le nombre de couches souhaitées.
Single ply membranes	Roofing membranes that are field applied using just one layer of membrane material (either homogeneous or composite) rather than multiple layers.	**Membrane unicouche**	Membrane de couverture appliquée sur place en une seule couche (homogène ou composite) plutôt qu'en couches multiples.
Single ply roofing	A roofing system in which the principal roof covering is a single layer flexible membrane often thermoset or thermoplastic membrane.	**Couverture unicouche**	Système de couverture dont le principal matériau de recouvrement est une seule couche de membrane souple, qui est souvent une membrane thermodurcissable ou thermoplastique.
Slag	A gray porous aggregate produced by air cooling and crushing residue from blast furnaces, used as a protective surfacing for shingles, roll roofing and built-up roofing. Also called blast-furnace slag. See also granules.	**Laitier**	Granulat poreux de couleur grisâtre obtenu par le refroidissement à l'air et le broyage du résidu provenant des hauts fourneaux ; utilisé comme surfaçage de protection pour les bardeaux, le feutre en rouleau et les couvertures multicouches. Aussi appelé laitier de haut fourneau. Voir également granulés.
Slope	The incline of a roof surface in degrees, as a slope ratio of fall to run, or as a percentage of fall to run. See incline.	**Pente**	Inclinaison d'une surface de toit en degrés, selon un rapport d'inclinaison d'un point à l'autre ou selon un pourcentage d'inclinaison d'un point à l'autre. Voir inclinaison.
Split	A membrane tear resulting from tensile stress.	**Fente**	Déchirure de la membrane imputable à une contrainte en traction.
Spudder	See scraper.	**Racloir**	Voir grattoir.
Stabilizer	1. Water insoluble mineral matter passing a 212u_m (NO.70) sieve used in a mixture with solid or semi-solid bituminous materials. 2. Various heat and light stabilizers are included in the formulation of PVC for roofing. See also filler.	**Stabilisant**	1. Matériau minéral insoluble dans l'eau accepté sur un tamis de 212μ_m (n70) servant d'adjuvant à des produits bitumineux solides ou semi-solides. 2. Différents stabilisants à la chaleur et à la lumière sont compris dans la formule des PCV pour couverture. Voir également filler.
Stack	A vertical vent pipe penetrating above a roof such as that used to provide an escape for foul gases from plumbing fixtures.	**Tuyau de cheminée**	Tuyau de ventilation vertical qui pénètre au-dessus d'un toit comme celui qui est utilisé pour évacuer les gaz responsables des infiltrations dans les appareils de plomberie.

Starter course	The first layer of roofing, applied along a line adjacent to the downslope perimeter of the roof area. With steep-slope watershedding roof coverings, the starter course is covered by the first course.	**Rangée de départ**	La première couche d'une couverture, posée le long d'une ligne rapprochée de la rive inférieure de la pente descendante de la toiture. Dans le cas du recouvrement de toitures qui évacuent l'eau sur une forte pente, la rangée de départ est recouverte par la première rangée.
Starter strip	A strip of felt applied at the eaves or other starting line of built-up roofing to serve as the base for the first full course of roofing.	**Bande de départ**	Bande de feutre appliquée sur l'avant-toit ou sur tout autre point de départ d'une couverture multicouche servant de base au premier rang complet du matériau de couverture. Également appelée feutre de départ.
Strainer	A wire, plastic or cast-metal cage placed over the top of a roof drain to prevent debris and leaves on the roof from entering the drain.	**Crapaudine**	Accessoire en fil métallique, en plastique ou en métal coulé destiné à arrêter les débris et les feuilles qui pourraient s'introduire dans l'avaloir du toit.
Stress	The force acting across a unit area in solid material in resisting the separation, compressing or sliding that tends to be induced by external forces. Also, the ratio of applied load to the initial cross-sectional area, or the maximum stress in the outer fibres due to an applied flexural load.	**Contrainte**	Force agissant sur une surface unitaire d'un solide en résistant aux efforts de séparation, de compression ou de glissement exercés de l'extérieur. Correspond également au rapport entre la charge appliquée et la section initiale ou à la contrainte maximale subie par les fibres extérieures en raison de l'application d'une charge de flexion.
Strip shingles	Asphalt shingles that are manufactured in strips, approximately three times as long as they are wide.	**Bardeau en bande**	Bardeau d'asphalte fabriqué en bandes dont la longueur est d'environ trois fois sa largeur.
Styrene Butadiene Styrene (SBS)	High molecular weight polymers that have both thermoset and thermoplastic properties, formed by the block copolymerization of styrene and butadiene monomers. These polymers are used as the modifying compound in SBS polymer modified asphalt roofing membranes to impart rubber-like qualities to the asphalt.	**Styrène-butadiène séquencé (SBS)**	Polymère possédant un poids moléculaire élevé, doté de propriétés à la fois thermodurcissables et thermoplastiques, formé par la copolymérisation par blocs de monomères de styrène et de butadiène. Ce polymère sert de modificateur des membranes de couverture en bitume modifié au polymère SBS et apporte au bitume des caractéristiques semblables à celles du caoutchouc.
Substrate	The surface upon which the roofing or waterproofing membrane is placed. It may be structural deck or insulation or any other base material.	**Support**	Surface sur laquelle la couverture ou la membrane d'étanchéité est installée. Il peut s'agir du platelage structural, de l'isolant ou de tout autre matériau de base.
Sump	A depression around a drain in the roof deck or insulation to provide a water reservoir.	**Puisard**	Dépression pratiquée autour d'un avaloir sur le platelage du toit ou sur l'isolant afin de constituer un bassin d'eau.

Surfacing	Any aggregate or granular material or coating used as a protective covering on the weather surface of roofing. The protective and traffic-bearing layer of a roof terrace is also called the top cover.	**Surfaçage**	Tout granulat ou matériau granulaire servant à protéger la couverture des intempéries. La couche de protection et de circulation d'une toiture-terrasse est également appelée couche coulée.
Tab	The exposed portion of strip shingles defined by cutouts.	**Patte**	Partie exposée des bardeaux en bande, définie par des entailles.
Tanker	A tank truck specially designed with heating and pumping equipment for conveying and dispensing liquid bitumen.	**Camion-bitumier**	Camion-citerne spécialement équipé du matériel de chauffe et de pompage pour transporter et distribuer le bitume liquide.
Tar	Black or dark brown liquid or semi-liquid condensates derived from the heating or baking, sometimes called destructive distillation, of wood, peat, oil shale, bone, petroleum, coal or other organic materials. The word is incorrectly used to describe asphalt as in the expression "tar-and-gravel roofing."	**Goudron**	Portion non aqueuse, de couleur noire ou brune foncée, du liquide résiduaire provenant de la distillation destructive du bois, de la tourbe, de schistes bitumineux, d'os, de pétrole, de charbon et d'autres matières organiques. Le terme est incorrectement employé pour désigner le brai de houille.
Thermoplastic Olefin Membrane (TPO)	A blend of polypropylene and ethylene-propylene polymers. Colorant, flame retardants, UV absorbers and other proprietary substances which may be blended with the TPO to achieve the desired physical properties. The membrane may or may not be reinforced.	**Membrane en oléfine thermoplastique (TPO)**	Mélange de polypropylène et de polymères d'éthylène-propylène. Des colorants, produits ignifuges, absorbeurs UV et d'autres substances brevetées peuvent être combinés au TPO pour lui donner les propriétés physiques désirées. La membrane peut être armée ou non.
Thermoset	Unaffected by heat. It is often called elastomer or synthetic rubber. The inertness imparts elasticity and weather resistance.	**Thermodurcissable**	Produit qui ne réagit pas à la chaleur. Il est souvent appelé élastomère ou caoutchouc synthétique. L'inertie lui confère l'élasticité et une bonne résistance aux intempéries, mais rend la soudure des joints plus difficile.
Torch applied	Method used in the installation of polymer modified bitumen membranes characterized by using open flame propane torch equipment.	**Application au chalumeau**	Méthode utilisée pour la pose des membranes de bitume modifié au moyen de polymères, caractérisée par l'utilisation d'appareils au propane dégageant une flamme nue.
Truss	A combination of members such as beams, bars and ties, usually arranged in triangular units, to form a rigid framework for supporting loads over relatively long spans as in wide span roof construction.	**Ferme**	Joint constitué de poutres, baguettes et attaches, généralement disposées en éléments triangulaires, servant de cadre rigide pour supporter des charges sur des travées relativement longues.
Ultraviolet (UV)	Invisible light radiation, adjacent to the violent end of the visible spectrum, with wavelengths from about 200 to 400 nanometres.	**Ultraviolet (UV)**	Radiations invisibles se trouvant à proximité l'extrémité violette du spectre visible, avec des longueurs d'onde d'environ 200 à 400 nanomètres.
Underlayment	See sheathing paper.	**Sous-couche**	Voir papier de revêtement.

Valley	The horizontal line formed along the depressed angle at the bottom of two inclined roof surfaces.	**Noue**	Canal constitué par l'angle interne formé par deux plans d'un toit.
Vapour retarder	Material used to retard the passage of vapour or moisture into the roof system where harmful condensation of vapour within the system could take place.	**Pare-vapeur**	Matériau servant à retarder le passage de la vapeur ou de l'humidité dans un système de couverture où les effets de toute condensation de vapeur pourraient être néfastes.
Vegetated roof	A roof membrane system with a top layer of living plants in an engineered soil blend (growth medium). Green roof systems are also referred to as vegetated roof covers, roof gardens, eco-roofs, or landscaped roofs.	**Toit végétalisé**	Système de membrane de couverture avec une couche supérieure de plantes vivantes dans un mélange de sol modifié (milieu de croissance). Les systèmes de toiture verte sont également appelés couvertures végétalisées, jardins-terrasses, écotoitures ou toitures paysagées.
Vent	An opening designed to convey water vapour or other gas from inside a building or a building component to the atmosphere, thereby relieving vapour pressure.	**Évent**	Ouverture conçue pour acheminer la vapeur d'eau ou tout autre gaz de l'intérieur du bâtiment ou d'un élément de bâtiment vers l'air libre, libérant ainsi toute pression de vapeur.
Vermiculite	An aggregate used for lightweight insulating concrete and roof fills, formed by the expansion of mica rock through heating.	**Vermiculite**	Granulat résultant de la dilatation du mica par chauffage; sert de béton isolant léger et de matériau de remplissage de toit.
Viscosity	The internal resistance offered by a fluid to change shape or to relative motion or flow of its parts. The flow characteristics of bitumen is measured in centistokes. Asphalt may vary from 30 to 500 centistokes when heated from 175°C to 260°C depending on the asphalt type.	**Viscosité**	Résistance interne offerte par un fluide à tout changement de forme ou à tout glissement d'une couche par rapport à une autre. Les caractéristiques d'écoulement du bitume sont mesurées en centistokes. L'asphalte peut varier entre 30 et 500 centistokes lorsqu'il est chauffé à une température comprise entre 175°C et 260°C (350 et 600°F) selon le type.
Vulcanization	An irreversible process during which a rubber compound, through a change in its chemical structure, e.g. cross linking, becomes less plastic and more resistant to swelling by organic liquids, and elastic properties are conferred, improved, or extended over a greater range of temperature. See also cross linking.	**Vulcanisation**	Transformation irréversible d'un caoutchouc brut sous l'influence de réactions physicochimiques (comme la réticulation) entraînant le passage d'un état à prédominance plastique à un état à prédominance élastique. Voir également réticulation.
Waterproof	The quality of a membrane, membrane material or other component to prevent water entry.	**Imperméable**	Qualité d'une membrane, d'un matériau de membrane ou d'un autre élément qui empêche la pénétration de l'eau.

Waterproofing	1. A material used to treat or cover a building element or component to prevent leakage of water. 2. Treatment of a surface or structure to prevent the passage of water under hydrostatic pressure.	**Imperméabilisation**	1. Un matériau utilisé pour traiter ou couvrir un élément d'un bâtiment afin de prévenir l'infiltration d'eau. 2. Traitement d'une surface ou d'une structure afin d'empêcher le passage de l'eau sous l'effet d'une pression hydrostatique.
Water shedding	The ability of individual, overlapping components to resist the passage of water without hydrostatic pressure.	**Résistance hydrostatique**	Capacité d'éléments individuels qui se chevauchent de résister au passage de l'eau sans pression hydrostatique.
Weatherproof	The ability of a membrane or roof covering to prevent the passage of water with a limited amount of hydrostatic pressure.	**À l'épreuve des intempéries**	Capacité d'une membrane ou d'un revêtement de couverture d'empêcher le passage de l'eau avec une quantité limitée de pression hydrostatique.
Winch	A hoist used for hauling or hoisting materials to the top of a roof.	**Treuil**	Monte-charge utilisé pour hisser des matériaux sur le toit.
Wind uplift	The force caused by the deflection of wind at roof edges, roof peaks or obstructions, causing a drop in air pressure immediately above the roof surface.	**Soulèvement sous l'action du vent**	Force provenant de la déflection du vent aux rives d'une couverture, aux faîtes ou aux obstructions, provoquant une baisse de pression de l'air immédiatement au-dessus de la surface de la couverture.
Wrinkles	Small ripples formed at the surface of roofing membranes similar to ridging.	**Plissement**	Petites ondulations à la surface des membranes de couverture ; ressemblent à des rides.